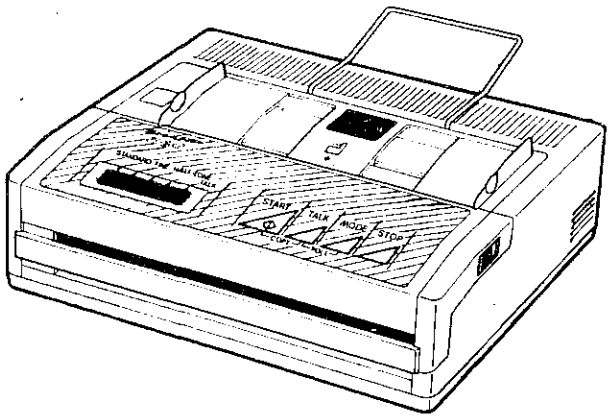
# SHARP SERVICE MANUAL

CODE : 00ZF200D/SM2E



# FACSIMILE

## MODEL FO-200

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SHARP CORPORATION

# Chapter 1 General description

## [1] SPECIFICATIONS

### 1. Terminal Specifications

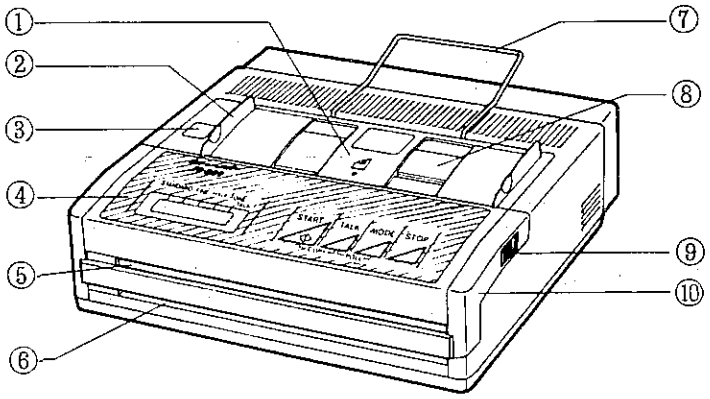
| Item | FO-200 |
|---|---|
| Applicable line | Public switched telephone network |
| Type | Desktop transceiver |
| Communication scheme | Half-duplex |
| Internal LIU | Type MA (manual/auto) |
| Compression scheme | MH |
| Synchronization | Transmission synchronized |
| Scanning | Solid state plane scanning by means of contact Image Sensor |
| Scan line density | Normal mode:<br>Main scan: 8 lines/mm (203 lines per in.)<br>Sub-scan: 3.85 lines/mm (98 lines per in.)<br>Fine mode:<br>Main scan: 8 lines/mm (203 lines per in.)<br>Sub-scan: 7.7 lines/mm (196 lines per in.) |
| Recording | Thermal recording |
| Liquid crystal display | 7 x 5 dots, 16 digits/2 lines, automatic shift |
| Paper cut | Manual |
| Talk reservation | Yes |
| Copy function | Yes |
| Poll request | Yes |
| Sender's name recording and send/receive report listing | Yes |
| Modem speed | 9600/7200/4800/2400 bps, with automatic fallback. |
| Transmission time | Approx. 25 sec. at 9600 bps. |
| Recording paper size | 8.5" (216mm) wide, 98.4 (30m) per roll |
| Effective recording width | 8.3" (210mm) (G3), 8.1" (205mm) (G2) |
| Transmitting document size | Width: 5.83" to 8.5" (148mm to 216mm)<br>Length: 5.04" to 11.7" (128mm to 297mm) |
| Effective scanning width | 8.3" (210mm) G2 (205mm) |
| G2 compatibility | Yes |
| Power requirements | 240 VAC, 50Hz |
| Physical dimensions | 11.6"(W) x 9.84"(D) x 3.16"(H) (295mm x 280mm x 80 m) |
| Weight | Approx. 10.4 lbs. (5.3kg) |
| Operating conditions | Temperature: 5 to 35°C<br>Humidity: 30 to 85% RH |
| Power consumption | 10W (standby)/120W (maximum) |
| Auto document feed | up to 5 sheets |
| Modulation sheme | QAM/PSK/FSK/AM-PM-VSB |

Transmission time is the time required to send the image information of the A4 standard document with the sub scan line density of 98 lines per in. under the Sharp mode, not including the control time given by the CCITT standards.

## 2. Major Components

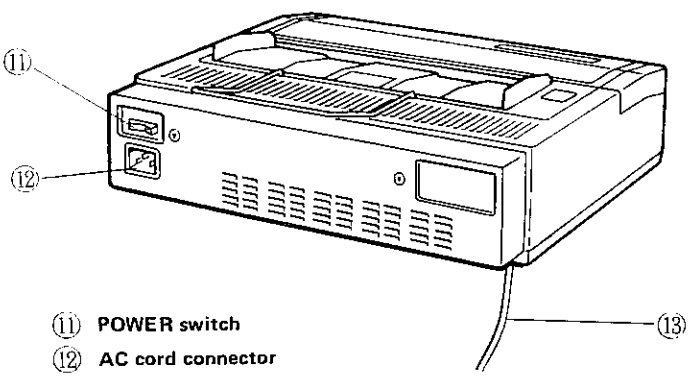
### 1. External view

**Font view**



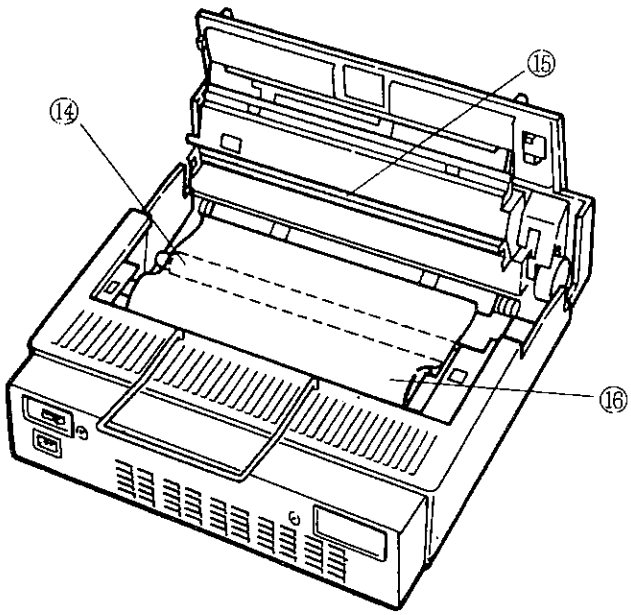

| | |
|---|---|
| ① **Document feeder** | Place document (S) to be transmitted or copied here. |
| ② **Adjustable document guide guide** | Set to the width of the document. |
| ③ **Paper compartment cover button** | Push this button to open the paper compartment cover. |
| ④ **Operation panel** | Refer to section "Description of Control Panel". |
| ⑤ **Original document exit** | Original document (S) exits the machine here. |
| ⑥ **Received document exit** | Recording documents come out here. |
| ⑦ **Document guide bar** | Supports document (S) for document feeder. |
| ⑧ **Paper compartment cover** | Open to replace recording paper, clear paper jams, or clean the thermal head. |
| ⑨ **Document cover release button** | If the document should become jammed or a problem occurs during transmission, push this to remove the document. |
| ⑩ **Document cover** | Open to remove the document or clean the read sensor. |

**Rear view**




⑪ **POWER switch**
⑫ **AC cord connector**
⑬ **Phone line cable**

**Recording paper compartment**

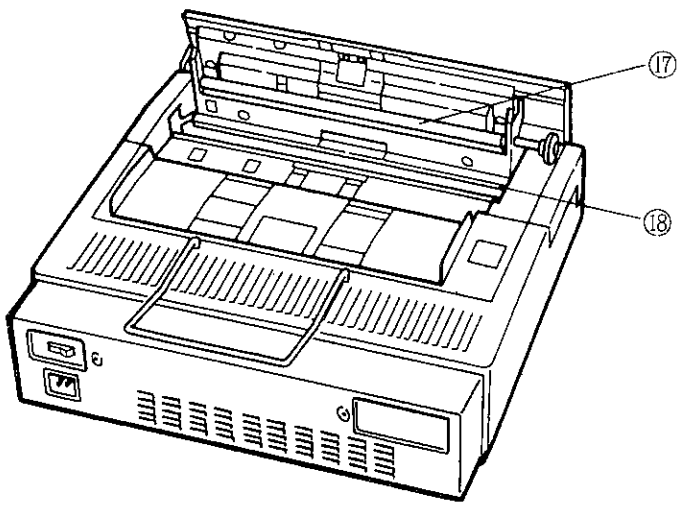



⑭ **Paper feed roller** — Feeds out the recording paper.

⑮ **Recording head** — Records received information on the paper.

⑯ **Paper roll**

**Document release cover**




⑰ **Document feed roller**

⑱ **Read sensor**

## [2] FEATURES

**Ultra-compact design**
With dimensions of only 11.6"(W) x 11.2"(H) x 3.2"(D) (295mm (W) x 280mm(H) x 80mm(D)) and a weight of just over 5.3kg, the FO-200 is extremely compact and lightweight. This allows full transportability for greater communication flexibility — the FO-200 can travel to office, home, and anywhere you need facsimile services.

**Half-tone transmission**
The FO-200 discerns and transmits eight levels of shading to ensure that the documents you send have fine resolution for reproduction with great clarity and detail. This feature, called Half-Tone Transmission, is especially useful for photos and illustrations. Facsimiles of fashion designs of architectural renderings, for example, can now faithfully convey the originals' subtle shading and depth. Half-ton transmissions can be received by any G3-compatible facsimile, regardless of manufacturer.

**Automatic contrast control**
The FO-200 automatically adjusts the contrast control to ensure you of the highest quality copy every time. In addition, a high-resolution. Fine Mode provides superb copy quality to assure that the documents you send provide a crisp and clear copy.

**Multi-purpose LCD display**
The 16-digit, 2-line liquid crystal display provides the information you need for easy monitoring of facsimile procedures. Operating mode, remote terminal identification, resolution, error messages and voice reservation are all clearly displayed for your convenience.

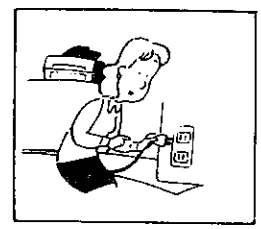
**Letter-size paper reading & printing**
The FO-200 can send or receive documents from letter size (8-1/2" x 11") (216mm x 279mm) to 39 inches in length to assure full communication capabilities with the most common document sizes.

**Other Features**
- CCITT G3, G2 compatibility
- 9600bps modem for high speed transmission
- Manual/automatic reception
- Talk reservation
- Polling function
- Copy function
- Convenient printing capabilities include activity report, and transmit terminal identification

## [3] INSTALLATION REQUIREMENTS

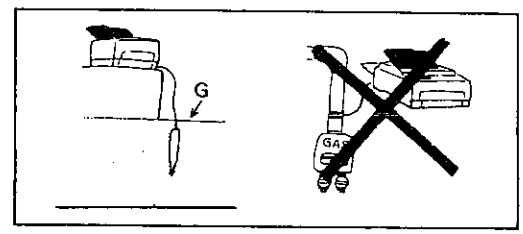
Attention must be paid to the following for proper machine operation and safety.

1. Connect to a standard wall outlet of 240 VAC, 50Hz.
   Connection with other line may result in a fire or damage to the fax machine.
   Never try to share the wall outlet with any other equipment.

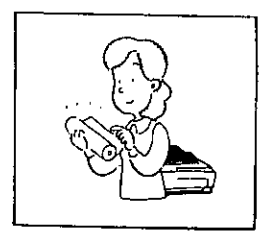


2. Ground connection is mandatory to avoid accidental injury.
   The ground cable must be connected to the following location.
   - Ground jack of the wall outlet.
   - Ground terminal from the ground line specifically provided for it.

   **Do not connect it to a gas pipe.**



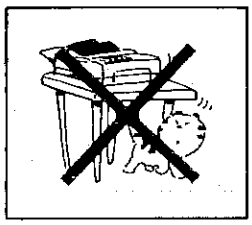

3. For optimum operation use sharp recording paper: FO-20PR6



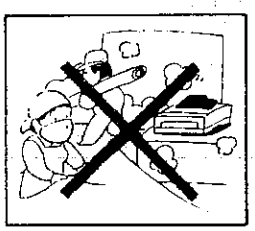
## [4] INSTALLATION LOCATION

■ **Do not install the unit under the following conditions.**

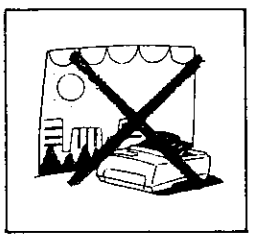
1. On an unstable or inclined desk.



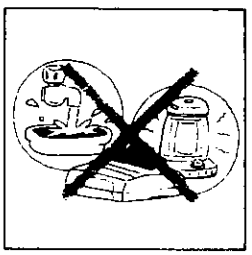
2. In a dusty environment, dust in the machine causes the recorded picture quality to deteriorate and may result in machine trouble.



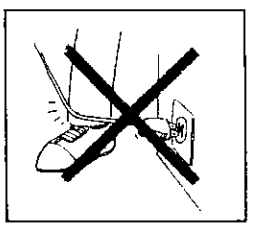
3. Where exposed to direct sunlight and high temperature; near by a heater or other heat generating equipment. It may cause the plastic components to deform or recording paper to discolor.



4. Where much humidity is encountered which is likely to cause the recorded picture quality to deteriorate. In addition, it affects the internal mechanism.



5. A location where the machines ground wire or power cord is likely to be disconnected inadvertently or trip someone.

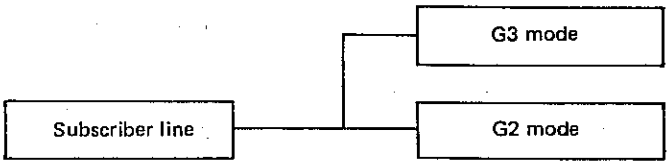


6. Near a television set or a radio unit.

## [5] KINDS OF FACSIMILE COMMUNICATIONS

### Subscriber line (PSTN)

The subscriber line is the telephone line normally used by general public. The following types of facsimile services are available.

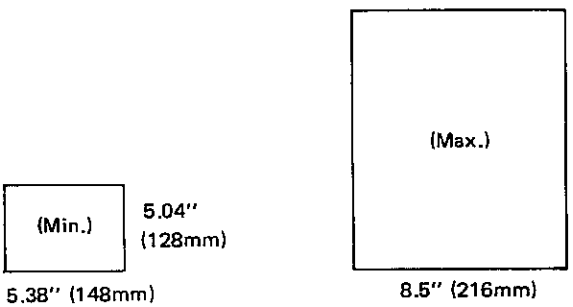



## [6] TRANSMITTING DOCUMENT

### 1. Document sizes

**SIZE**

| | | |
|---|---|---|
| Width | | 5.83" to 8.5" (148mm to 216mm) |
| Length | Automatic feed | 5.04" to 11.7" (128mm to 297mm) |
| | Manual feed | 39.4" (1000mm) max. (G3 operation)<br>27.6" (700mm) max. (G2 operation) |




11.7" (297mm) (Automatic feed.)
39.4" (1000mm) (Manual feed. G3 mode)
27.6" (700mm) (Manual feed. G2 mode)

**Paper weight (thickness)**

| | Weight (lbs/inch$^2$) | Thickness (inch) |
|---|---|---|
| Automatic feed | $0.07\times10^{-3}$ to $0.15\times10^{-3}$ ($52g/m^2$ to $104g/m^2$) | 0.0024 to 0.0047 (0.06mm to 0.12mm) |
| Manual feed | $0.07\times10^{-3}$ to $0.20\times10^{-3}$ ($52g/m^2$ to $157g/m^2$) | 0.0024 to 0.0079 (0.06mm to 0.20mm) |

**Number of Sheets Continuously Transmittable**

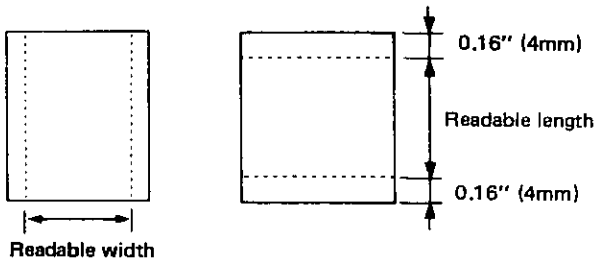
- Automatic feed . . . . . 5 sheets maximum
- Manual feed . . . . . Single sheet only

**Readable Width and Length**

The readable width and length of a document are smaller than the document size. Note that characters or graphics outside the effective document scanning range cannot be read.

- **Readable width**
  G3 mode . . . . . 8.3" (210mm) max.
  G2 mode . . . . . 8.1" (205mm) max.

- **Readable length**
  This is the length of the document sent minus 0.16 inch (4mm) each from the top and bottom edges.




## 2. Transmittable document types and conditions

### Document Types

- Normal paper
  Documents handwritten by pencil (No.2 lead or softer), fountain pen, ballpoint pen, or felt-tipped pen can be transmitted. Documents of normal contrast duplicated by a copying machine can also be transmitted.
- Diazo copy (blueprint)
  Diazo copy documents of a normal contrast may be transmitted but must be sent in light mode.
- Carbon copy
  A carbon copy may be transmitted if its contrast is normal.

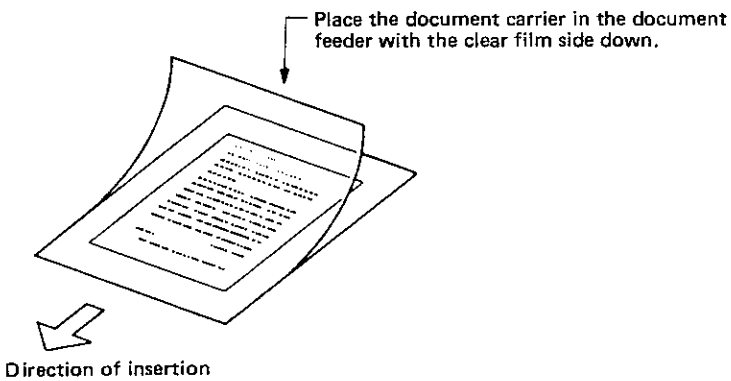
### Cautions in Transmitting Documents

- Documents written in yellow, yellow green, or light blue ink cannot be transmitted.
- Ink, glue, and correcting fluid on documents must be dry before the documents are transmitted.
- All clips, staples, and pins must be removed from a document before transmission.

## 3. Use of document carrier

A document carrier must be used ror any of the following documents.

- Those containing creases, folded corners, or curls
- Those containing tears
- Transparencies
- Those smaller than 5.83"(W) x 5.04"(L) (148mm(W) x 128mm (L))
- Those thinner than the three attached paper samples.
- Carbon-backed documents
  To transmit this kind of document, insert a white sheet of paper between the carbon back of the document and the document carrier.
- Those containing an easily separable writing material (e.g., tracing paper written on with a soft, heavy lead pencil).




**NOTES:**

1. When using the document carrier, carefully read the instructions written on its back.
2. If the document carrier has a soiled surface, it must be cleaned with a cloth dampened with water and then dried before using it for transmission.
3. Do not use two or more document carriers for continuous, multipage transmission.

## [7] SENDER'S INFORMATION

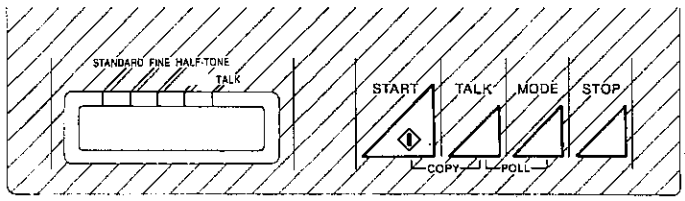
1. The time appearing in the sender's information is the time at the transmitter.
2. The sender's information can contain up to 16 of alphanumerics digits.

## [8] SEND/RECEIVE REPORT LISTING

1. After the send/receive report list has been printed, memory is cleared.
2. When the contents of the memory exceeds about 30 records, the first record in the memory is deleted when auto print mode is deactivated.
3. It is possible to program the unit by means of the user switch to make automatic printout of the send/receive report when the memory becomes full. See User switch description.
4. It is programmable with the user switch to set the size of the send/receive report to a data length or A4 size. See User switch description.

* To print out the send/receive report, press the START and MODE switches at the same time. Then, press START twice.

## [9] OPERATION KEYS




| | Normal function | During programming |
|---|---|---|
| START | Used to initiate transmission receiving when in manual mode. | Used as a entry and registration start key. |
| TALK | Used to go into the talk mode in order to make verbal communication. | Used as a selection key. |
| MODE | Used to select auto or manual receive, standard, fine, and halftone print modes. | Used as a selection key. |
| STOP | Used to stop operation or alarm. | Used as a cancel key. |
| START + TALK | Used to make a copy. | |
| TALK + MODE | Used to poll. | Used to make entry during registration of the sender's information. |
| START + MODE | Used to enter the print or program mode. | Used to go into the registration mode. |

NOTE:
"+" means to press two keys at the same time.

# [10] MODE SETTING

## 1. How to enter into the registration mode

(1) Press START + MODE

| |
|---|
| DRUECKE: START<br>PROGRAM: MODE |

(2) Press MODE

| |
|---|
| PROGRAM: START<br>DRUECKE: MODE |

(3) Press START

| |
|---|
| PASSCODE: MODE<br>USER SW: TALK |

(4) When the MODE or TALK key is pressed repeatedly, registration items change in sequence. Press STOP to return to the STANDBY mode.

* MODE ... Forward (1 to 6)
TALK ... Backward (6 to 1)
1. PASS CODE
2. TTI
3. DATE & TIME
4. USER SW

(5) When the desired item comes up on display, and is located to the left of the prompt "START", press START.

NOTE:

- For correction of TTI, data & time, terminal #, and user sw, simply do it over again. For other items, erase and enter it all over again.

## 2. Passcode # entry

The passcode which is the telephone number of the other end must be registered to authorize polling.
Up to ten passcodes can be registered.

(1) Bring "PASSCODE:START" onto display.

| |
|---|
| PASSCODE: START<br>TTI SET: MODE |

When the above prompts appear on the display press — "START" and the prompts shown below will appear.

| |
|---|
| SETZEN: TALK<br>LOESCHEN: MODE |

REGISTRATION

(3) Press TALK

| |
|---|
| SET # (01—10)<br>DRUECK MODE/TALK |

(4) Press MODE or TALK repeatedly until the desired code (01-10) is chosen.
(5) Press START
(6) Select the first digit of the number with MODE or TALK key.
(7) Press START
(8) Enter the succeeding number by repeating steps (6) and (7). It is possible to entry of a number consisting of 20 digits maximum.
(9) When the entire number has been entered, press START to return to (4).
(10) To terminate registration:
Press STOP to return to the standby mode.
Press START to go to the security mode.

ERASURE

(3) MODE

| |
|---|
| PASSCODE # CLEAR<br>SETZE # (01—10) |

(4) Repeat pressing the MODE key until the desired item (01-10) is chosen.
(5) Press the START key to return to (4).
(6) To terminate the erasure mode:
Press STOP to return to the standby mode.
Press START to return to programing mode.

## 3. TTI setting

The sender's telephone number and the name are registered. The TTI code also functions as a identification number in the polling mode.

(1) Bring TTI set: Start onto the display.

| |
|---|
| TTI SET: START<br>DAUM & ZEIT: MODE |

(2) Press START
(3)

| |
|---|
| SETZ EIGN. OWN TEL #<br>DRUECK MODE/TALK |

Press MODE or TALK to select the first digit of the number.
(4) Press START
(6) Repeat (4) and (5) to enter the rest of number (20 digits, maximum).
(7) After last digit is entered press START.
(8) Enter the name of the sender.
Select the first character of the name using the MODE or TALK key as shown below. See the character table for characters that are available for use.

**CHARACTER TABLE**

MODE →

| |
|---|
| ① 0 1 2 3 4 5 6 7 8 9 |
| ② A B C D E F G H I J K L M N O P Q R S T U V W X Y Z |
| ③ a b c d e f g h i j k l m n o p q r s t u v w x y z |
| ④ □ ! " # $ % & ' ( ) * + , — . / : ; < = > ? [ ¥ ] ^ _ ` { \| } → ← @ □ |

□ ... Space

← TALK

(a) By —ressing MODE and TALK at the same time, character block can be selected block 1, 2 3, or 4.

| |
|---|
| A<br>SETZ ALPHA START |

(b) Bring the charactr block to be entered on the display, choose the character to be entered with MODE or TALK key.

| |
|---|
| E<br>SETZ ALPHA START |

(c) Press START.

| |
|---|
| E<br>DRUECK START LAST |

(d) Enter the succeeding character by repeating steps (a), (b), and (c). Up to 16 characters can be entered.

(9) Press START to return to programing mode after all desired characters have been entered.
Press STOP to return to the standby mode.

## 4. Date & time setting

Enter the month, day, year, day of week, and time.
Ex: To enter November 28, 1986, 12 hours and 34 minutes.
(1) Bring "DATE & TIME:START" onto the display.

```
DATUM & ZEIT: START
USER SW: MODE
```

(2) Press START

```
DATUM & ZEIT: SET
DATE XX-XX-XX (X)
DAT.
```

Entering the day:
(3) Press MODE or TALK and choose the figure.
(4) Select "2" and press START.
(5) Select "8" and press START.
Entering the month:
(6) Pressing START now moves the cursor 1 space to the right. Pressing the STOP button moves the cursor 1 space to theleft.
(7) Press MODE or TALK and chosse the figure.
Select "1" and press START.
(8) Select "1" and press START.
Entering the year:
(9) Press MODE or TALK and choose the figure.
(10) Select "8" and press START.
(11) Select "6" and press START.
Entering the day of week:
Enter the day of week (SUN: 0, MON: 1, TUE: 2, WED: 3, THU: 4, FRI: 5, SAT: 6).
(12) Press MODE or TALK, the above codes are displayed for the day of week.
(13) Select "5" for Friday and press START.
Entering hours:
(14) Press MODE or TALK and choose the figure
(15) Select "1" and press START.
(16) Select "2" and press START.
Entering minutes:
(17) Press MODE or TALK and choose the figure
(18) Select "3" and press START.
(19) Select "4" and press START.
(20) Press START to enter time and date into memory and return to the programing mode.

## 5. User switch setting

Modes are assigned with this procedure. Assignment is done using only the "1" or "0" key. Normally, all items have been set to "0".

User switch = 00000000
1 8

The above represents switch number 1 thru 8 from left to right.
Each switch has the following functional significance:

| SW No. | Item | Setting 0 | Setting 1 |
|---|---|---|---|
| 1 | Reserved. To be set to "0" at all times. | — | — |
| 2 | Reserved. To be set to "0" at all times. | — | — |
| 3 | Reserved. To be set to "0" at all times. | — | — |
| 4 | Activity report length | Datalength 1 | Letter in place of A4 |
| 5 | Activity report; automatic print out when memory is full. | No | Yes |
| 6 | Receive mode upon power on | Auto | Manual |
| 7 | Reserved. To be set to "0" at all times. | — | — |
| 8 | Reserved. To be set to "0" at all times. | — | — |

NOTE (*1):
Printout is not produced when received from the FO-2516, FO-2715, and FO-600.
Ex: To set the user switch to 10100100.
(1) Bring "USER SW:START" onto the display.

```
USER SW: START
PASSCODE: MODE
```

(2) Press START.

```
USER SW = 00000000
WAEHLE MIT MODE
```

(3) Press MODE or TALK, then "1" and "0" changes, alternately.
(4) Select "1" and press START.
(5) Repeat (3) and (4) to enter after the switch 2.
Enter 0, 1, 0, 0, 1, 0, 0.
(6) When all eight numbers have been entered, press START to return to the programing mode.

## 6. Activity report (send/receive report listing)

The items registered can be confirmed on the activity report.
Observe the following key entry sequence to print out.
(1) Press START + MODE.

```
DRUECKE: START
PROGRAM: MODE
```

(2) Press START.

```
UEBERT. REP: START
CODE LIST: MODE
```

(3) Press MODE.

```
CODE LIST: START
UEBERT. REP: MODE
```

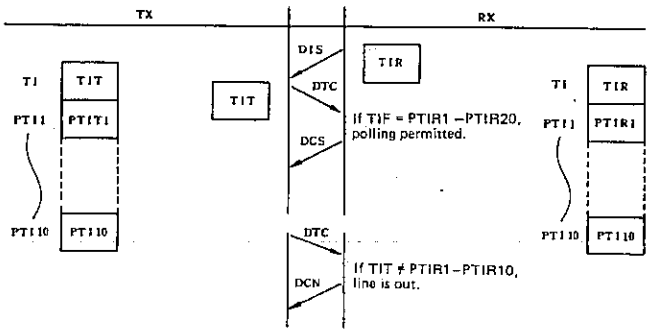
(4) Press START to start printing.

# [11] SECURITY (POLLING)

## 1. Telephone number verification

FIF of CIG (TI number of the remote unit) is verified with passcode.
If, for instance, a single digit of "1" were to exist in the passcode, polling is permitted when the low order 1 digit of the remote telephone number is "1". If an entire passcode has been registered, polling is not enabled unless the entire number coincides with the telephone number.

## 2. Polling determination procedure




TI: Own phone number
PTI: Passcode #

## 3. FO-200 polling determination table

1) Polled

| Model of the remote unit | Setting | | Polling |
|---|---|---|---|
| | Local unit | Remote unit | |
| Other make | Passcode No.1 = 0987654321 | FIF of CIG = 0987654321 | Polling possible as the passcode of the local unit is registered in the telephone No. of the remote unit, provided that the remote unit has signal option of CSI, TSI, CIG. |

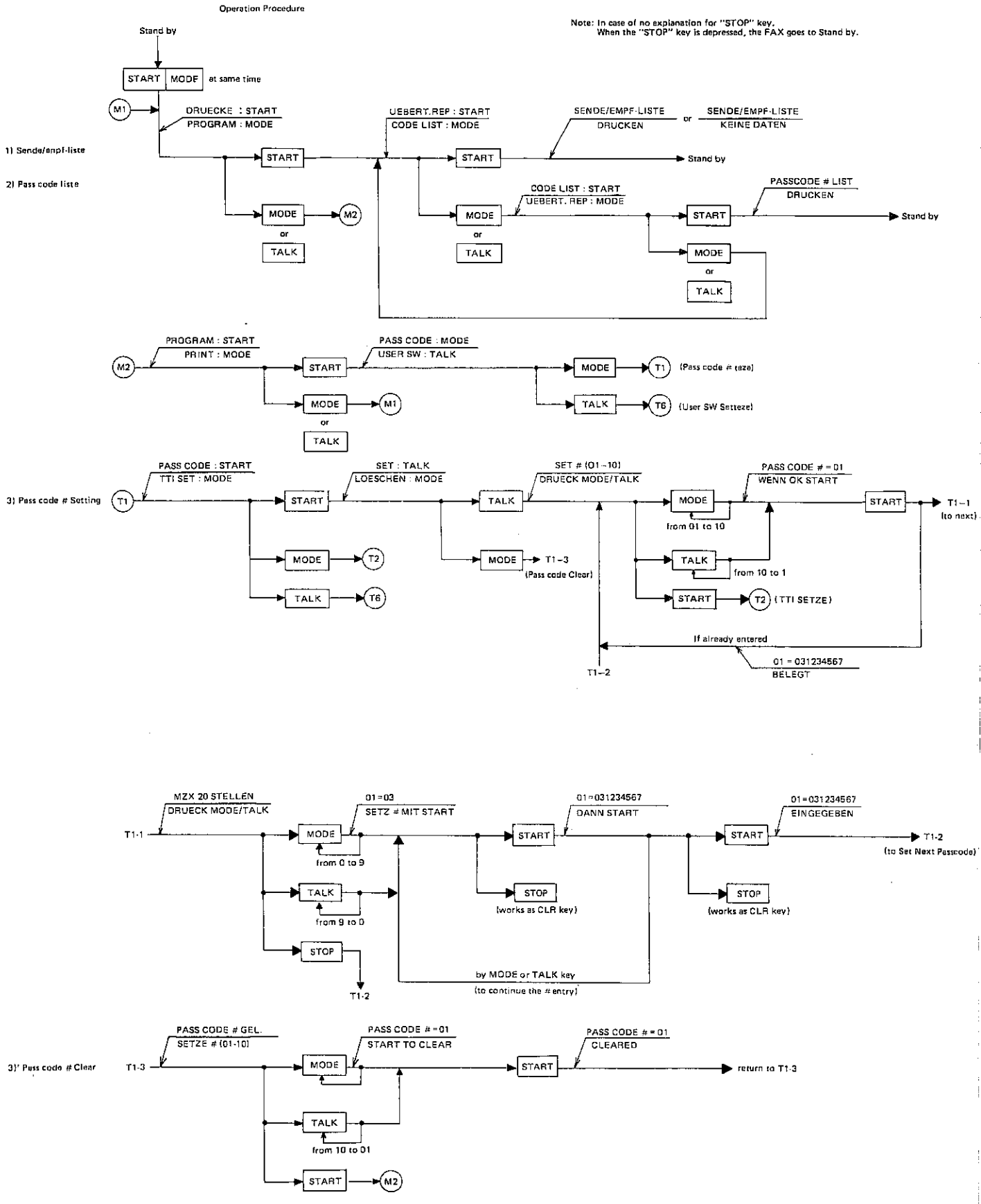
NOTE: Polling not permitted in other case.

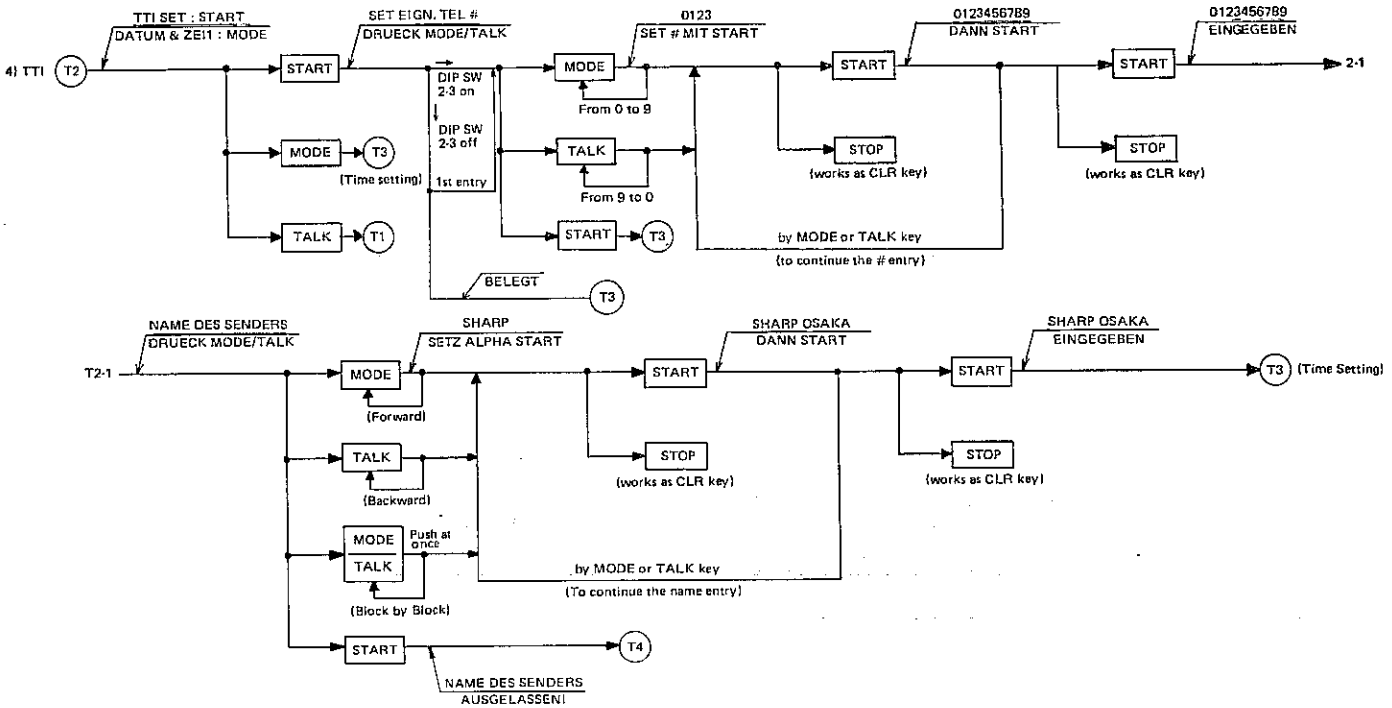
2) Polling

| Model of the remote unit | Setting | | Polling |
|---|---|---|---|
| | Local unit | Remote unit | |
| Other make | Telephone number registration | Passcode verified with FIF of CIG. | Polling possible |

## [12] Operational procedure

**NOTE:**
**Unless otherwise specified, depression of the STOP key causes the control to go into the standby mode.**






## [Character Table]

MODE →

① 0 1 2 3 4 5 6 7 8 9

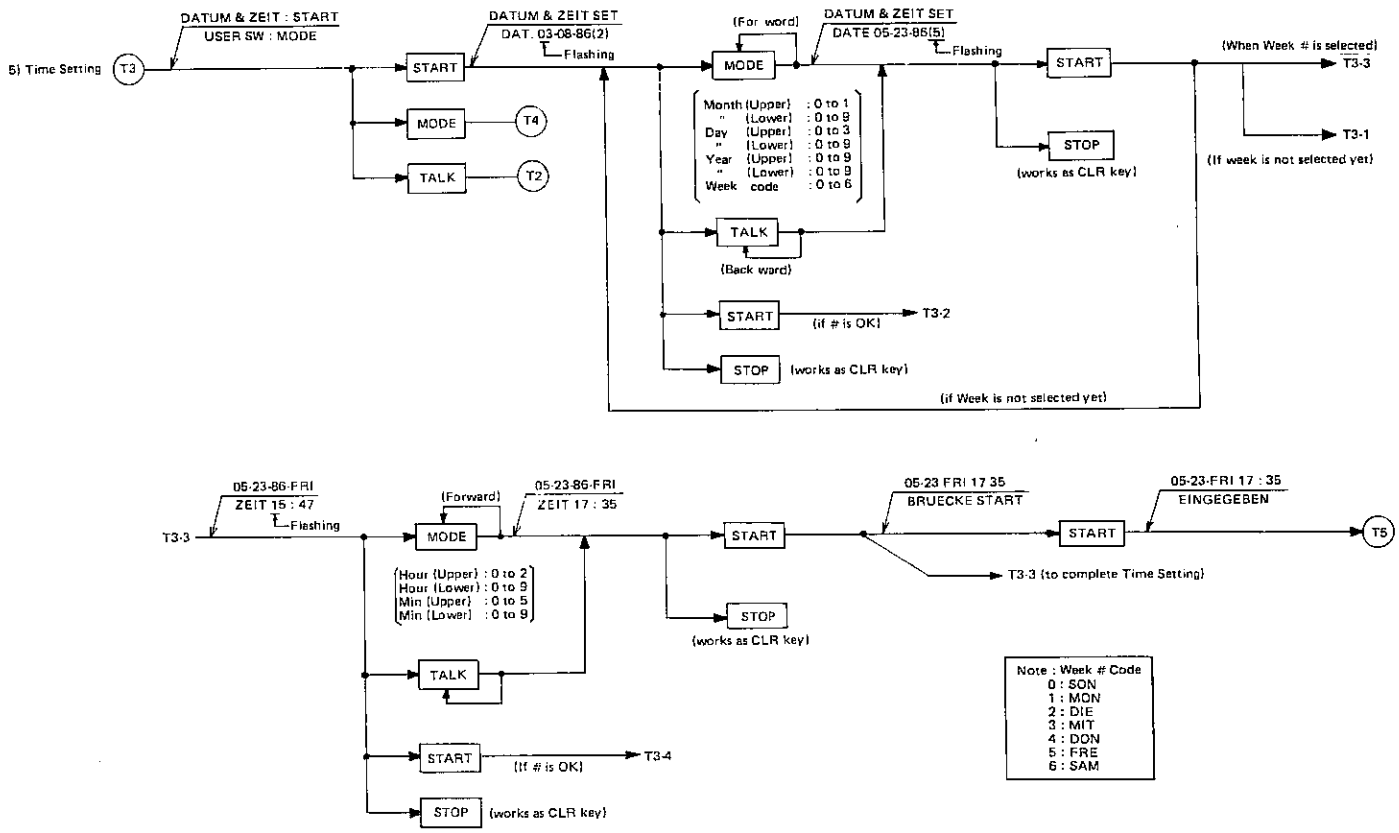
② A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

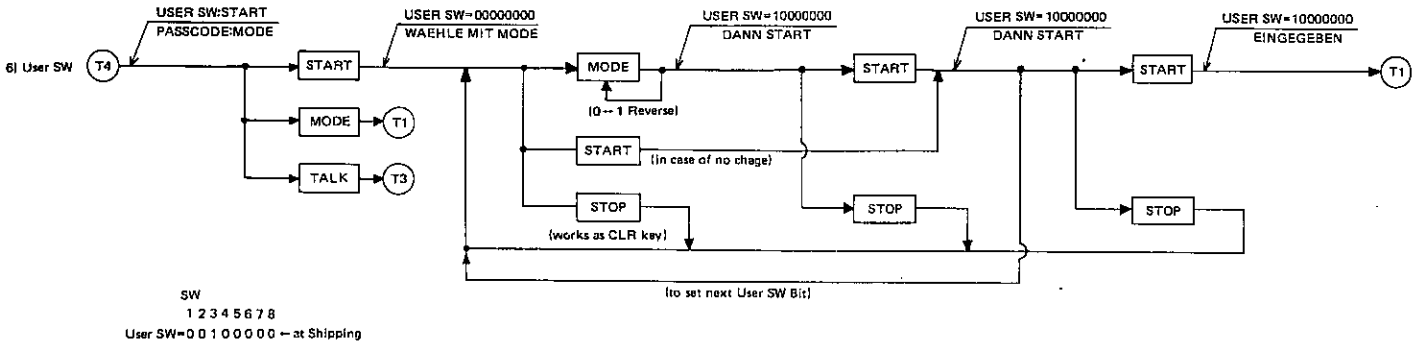
③ a b c d e f g h i j k l m n o p q r s t u v w x y z

④ □ ! " # $ % & ' ( ) * + , — . / : ; < = > ? [ ¥ ] ^ _ ` { | } → ← @ □

□ ... Space

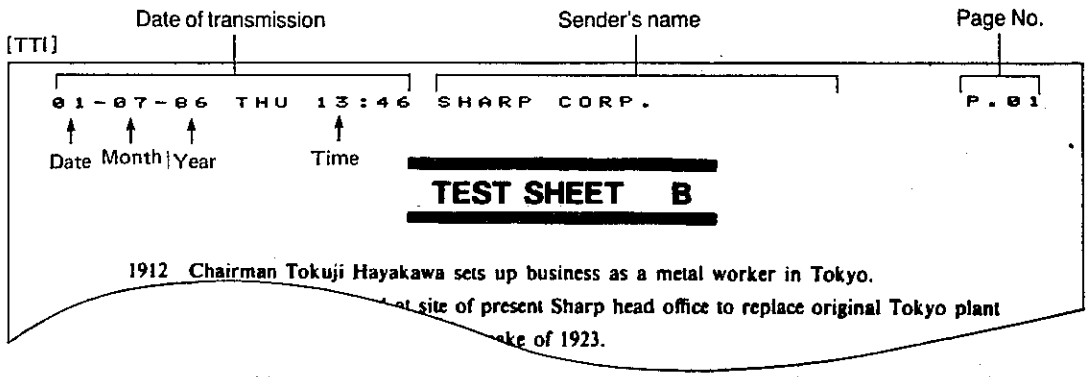
← TALK

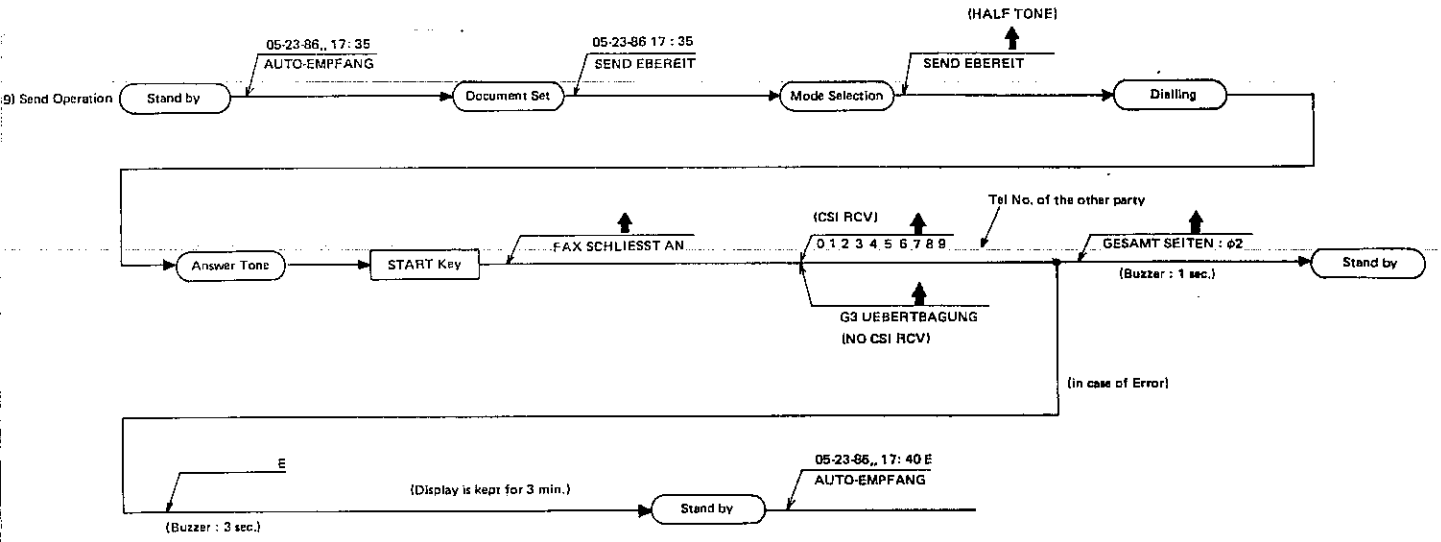





| SW No. | Item | Setting | |
|---|---|---|---|
| | | 0 | 1 |
| 1 | Reserved.<br>To be set to "0" at all times. | — | — |
| 2 | Reserved.<br>To be set to "0" at all times. | — | — |
| 3 | Reserved.<br>To be set to "0" at all times. | — | — |
| 4 | Activity report length | Data length | Letter in place of A4 |
| 5 | Activity report : Automatic print out when memory is full | NO | YES |
| 6 | Receive mode upon power on | Auto | Manual |
| 7 | Reserved.<br>To be set to "0" at all times. | — | — |
| 8 | Reserved<br>To be set to "0" at all times | — | — |

Print example:




**Other Display Prompts**

1) Erro Messages

| | |
|---|---|
| KEIN PAPIER | : Paper Roll Empty |
| ABD. SCHLIESSEN | : Paper Roll Cover is not closed. |
| ORIGINAL STAU | : Document is jammed. |
| E<br>LINE ERROR | : Send/Receive Error |

2) Other Messages

| | |
|---|---|
| PAPER EINZUG | : By giving Copy operation for positioning Paper Edge (when the new roll is set.) |
| 05-03-86 17 : 35<br>MAN-EMPFANG | : In case of Manual Reception Mode |
| KOPIER FUNKTION | ; While copying |
| TALK DERUNG | : Requesting Voice Communication by TALK key |
| RUFAN FORD<br>TALK DRUECKEN | : After the remote FAX depressing TALK key |
| SPRECH FUNKTION | : FAX is in TALK mode. |
| G3, G2 EMPFANG | : While receiving (with Nos. of Pages) in case of no TSI (Tel. No.) from the other FAX |
| ABRUF | : by depressing POLL (TALK & MODE keys) keys |
| ORIGINAL EINZUG | : While feeding document out by Copy Operation (in case of Document Jam due to power out.) |

# Chapter 2 Adjustments

## [1] ADJUSTMENTS

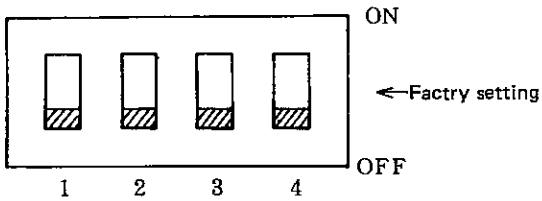
Since items 1, 2, 4, and 5, have been set and adjusted, there is need of adjusting at installation.

### 1. Control PWB dip switch setup

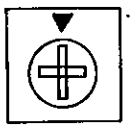
(1) The dip switches were factory set in the following manner.

a) SW1
To be set to the ON position.

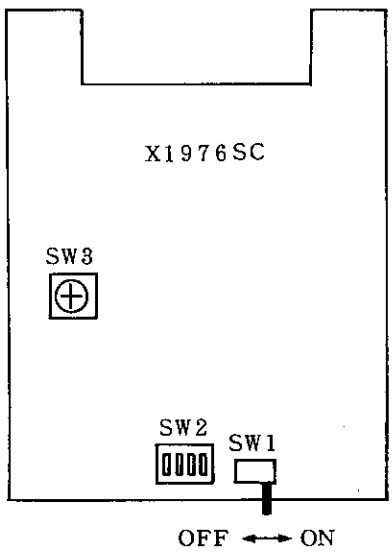
b) SW2




c) SW3



Set it to an appropriate position according to the resistor value.




(2) Switch description

a) SW1
For on/off of the battery.

b) SW2 (DTS-4)

| SW No. | Name | Function |
|---|---|---|
| 1 | Connection | ON: Direct OFF: Normal |
| 2 | Wait | ON: CPU wait, OFF: CPU run |
| 3 | TTI protect | ON: TTI not protect<br>OFF: TTI protect |
| 4<br>See NOTE1 | Memory clear | ON: memory clear, OFF: no memory clear |

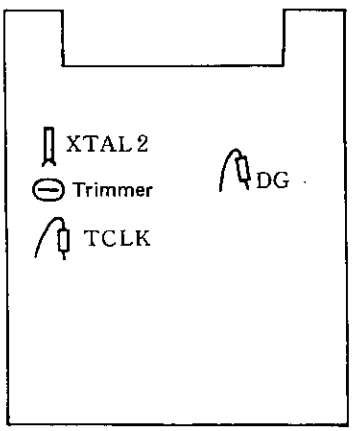
NOTE 1: Clears all memory except time and date.

c) SW3 (rotary type dip switch)
The switch must be set according to the resistor value of the thermal head.

| Thermal head resistor value (ohms) | SW position |
|---|---|
| 569-581 | F |
| 582-593 | E |
| 594-606 | D |
| 607-619 | C |
| 620-631 | B |
| 632-644 | A |
| 645-656 | 9 |
| 657-669 | 8 |
| 670-682 | 7 |
| 683-694 | 6 |
| 695-707 | 5 |
| 708-720 | 4 |
| 721-732 | 3 |
| 733-745 | 2 |
| 746-757 | 1 |
| 758-770 | 0 |

### 2. Clock adjustments (Not field adjustable)

The frequency (64Hz) on the test pin (TCLK) must be adjusted by the trimmer capacitor.



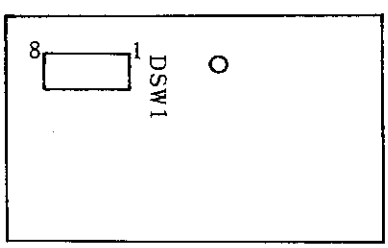

Adjustment method
Measure the frequency on the TCLK test pin and adjust it to th room temperature in reference to the table below.

| Room temperature (Ta) | Central frequency (msec) | Adjusting range |
|---|---|---|
| 15°C ≦ Ta < 17°C | 15.624992 | 15.625000—15.624984 |
| 17°C ≦ Ta < 19°C | 15.624976 | 15.624984—15.624968 |
| 19°C ≦ Ta < 21°C | 15.624963 | 15.624971—15.624953 |
| 21°C ≦ Ta ≦ 29°C | 15.624953 | 15.624968—15.62492 |
| 29°C < Ta < 31°C | 15.624963 | 15.624971—15.624953 |

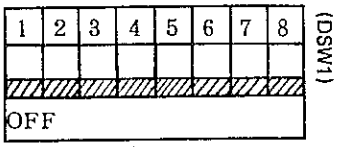
### 3. LIU board switch setup

The switches have been factory set up in the following manner.

a) Dip switch position



b) Set the dip switch in the following way.




c) Dip switch description

| Switch position | Description |
|---|---|
| 1 | Transmission level — 2 dB |
| 2 | Transmission level — 4 dB |
| 3 | Transmission level — 6 dB |
| 4 | Transmission level — 8 dB |
| 5 | Transmission level — 10 dB |
| 6 | Transmission level — 12 dB |
| 7 | Transmission level — 14 dB |
| 8 | Transmission level — 16 dB |

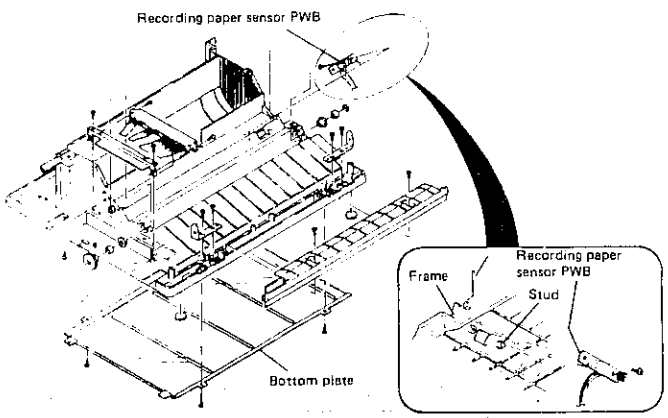
## 4. Sensor adjustment procedure

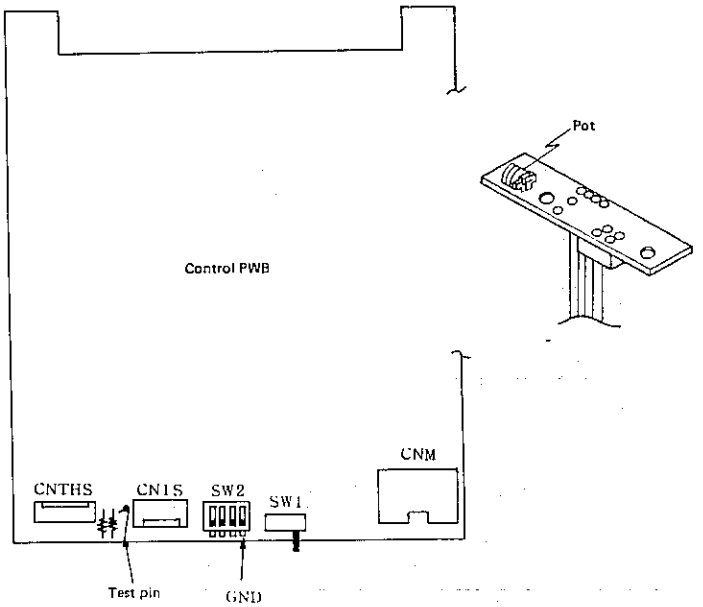
Sensor output voltage must be adjusted for only the recording paper sensor for the FO-200.

Adjustment method

| Sensor name | Test pin | VR | Method | Note |
|---|---|---|---|---|
| Recording paper sensor | Test pin beside the connector CN1S on the control board | VR on the sensor board | Adjust the test pin output voltage to 4.0 to 4.2V | Load the recording paper (w/o end mark) and close the frame. Paper lead edge must come out of cutter. |

NOTES:
1) When measuring the test pin voltage, use the SW2—4 for ground.
2) Satisfactory if 3.8 to 4.4V after adjustment.
3) When using a screwdriver for this adjustment, use a plastic screwdriver or metalic screwdriver wrapped.



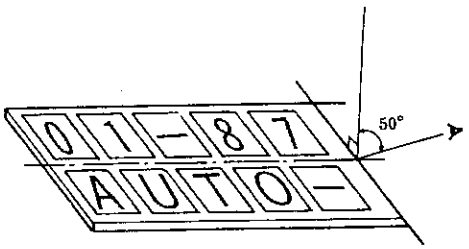

## 5. LCD (panel) contrast adjustment

Visually adjust the contrast of the LCD on the panel.

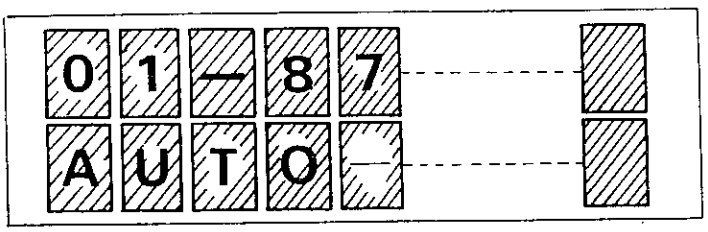
1) Turn on the main switch with the control PWB in the machine. Then, the following is displayed.

| 01-02-87 21 : 35<br>AUTO-RECEIVE | DAY-MONTH-YEAR | HOURS : MINUTE |
|---|---|---|

2) See the LCD in the angle of 50 degrees as illustrated.



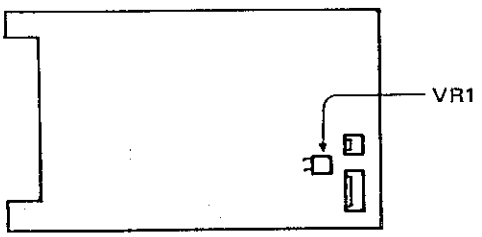

3) Turn the pot VR1 on the control PWB clockwise to increase the contrast, then stop it when the desired contrast is obtained.




(View angle of 50°)

(Looked from the angle of 50 degrees)

4) Location of VR1 on the control PWB



# [2] DIAGNASTICS AND SERVICE USE SOFT SWITCHES

## 1. Diagnostic mode

The following can be accessed in the diagnostic mode;

- Service use soft switches SW2, SW3, and SW4.
- Test pattern
- Operators panel test
- ROM-RAM test
- Auto feeder test
- Signal transmission
- Aging test
- G2 transmission mode
- G3 transmission mode
- Communication test
- Scan correction mode

## 2. Entering the diagnostic/softwitch mode

- Turn power switch OFF.
- Whilt pressing the start key and mode key at the same time turn the power switch ON.
- The display will show "push stop key".
  Disregard it and press the start key instead. This prompt is provided intentionally to prevent the user from accidently entering the diagnostic mode.
- The display will now show

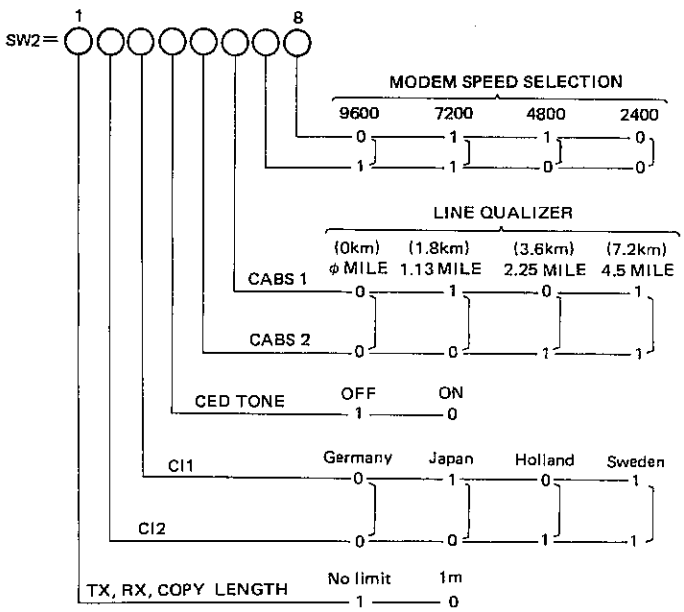
| SOFT SWITCH MODE<br>PUSH START KEY |
|---|

- At this point pushing the start key will put the machine in the soft switch mode starting with SW2, followed by SW3 and SW4. However, if the mode key is press the test modes can be accessed.

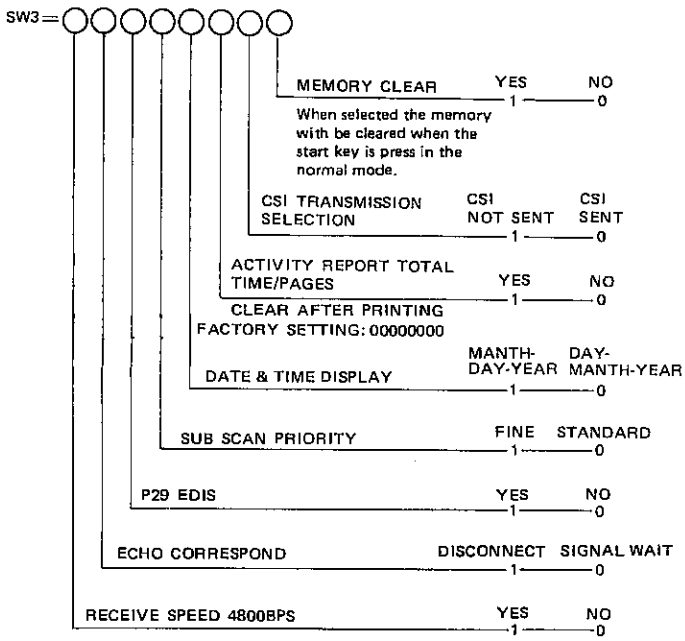
## 3. Soft switch mode

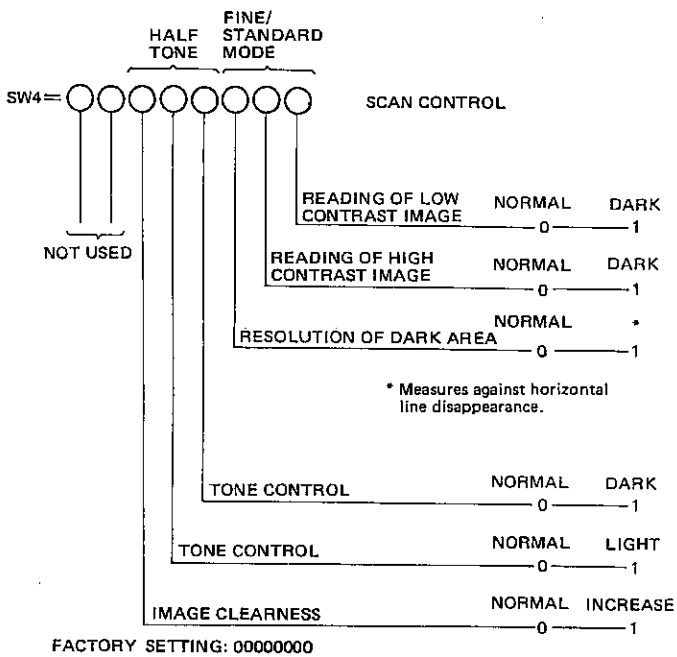
Once in the soft switch mode the display will show the left most position is switch 1 with the right most position being switch 8. The switch position being acted upon will be flashing, pressing of the mode key will change the switch from its current state; if it was 1, it will change to 0, if 0 it will change to 1. Once the state of switch is decided pressing of the start key will move the cursor to the next position to the right. Pressing the stop key will move the cursor to the left.

| SOFT SWITCH MODE<br>SW2 = OOOOOOOO |
|---|




FACTORY SETTING: 00000010




FACTORY SETTING: 00000000

## 4. Diagnostic test mode

- Check pattern
  This test results in the unit printing all black and all white patterns and is repeated alternately. This test is good in testing functionality of the thermal lead and the print circuit.
- Panel check mode
  After entering this mode push a key to check for proper of that key. For example, when the start key is press "START" will appear on the display indicating that it is OK.
  When the stop key is pressed, "STOP" is displayed then all charter segments are turned on giving all black blocks. The unit will then go into the Standby mode.
- ROM and RAM check
  Test data "OO thru FF" is written and read over the 8KB area to check for errors. A ROM sum check is also made.
  If everything is OK the unit will give A3 second beep. If there is an error the following will occur;

  Single beep = failure in ROM1 (IC36)
  Two beeps = failure in ROM2 (IC33)
  Three beeps = failure in ROM3 (IC31)
  Four beeps = failure in RAM (IC62)

- Auto-feeder mode
  In this mode the document feeder function is tested.
  Press stop to exit this mode

- Signal send mode
  G3 and G2 signals are sent out one at a time after depression of the start key.
  After pressing the start key to enter the mode no signal will be heard. Pressing the start key again will give the first signal (9600 bps carrier signal) shown below. Each time the start key is pressed the next signal in line will be heard, pushing the start key after the last signal will exit the test mode.

| | | |
|---|---|---|
| 1 | 9600 bps CARRIER | (G3 modem) |
| 2 | 7200 bps CARRIER | (G3 modem) |
| 3 | 4800 bps CARRIER | (G3 modem) |
| 4 | 2400 bps CARRIER | (G3 modem) |
| 5 | 300 bps CARRIER | (G3 modem) |
| 6 | CED tone (2100Hz) | (G3 modem) |
| 7 | 462 Hz | (G2 modem) |
| 8 | 1080 | (G2 modem) |
| 9 | 1500 | (G2 modem) |
| 10 | 1650 | (G2 modem) |
| 11 | 1850 | (G2 modem) |
| 12 | 2100 | (G2 modem) |
| 13 | G2 PHS | (G2 modem) |
| 14 | Black | (G2 modem) |
| 15 | White | (G2 modem) |
| 16 | 4 rasters/mm | (G2 modem) |

- Aging mode
  A test pattern is produced and is repeated every 20 minutes for up to ten copies.
  If a document is in the send tray, a copy of the document is made. This can be done for up to 10 documents.
- G2 transmission mode
  Transmission and reception is carried out in this mode.
- G3 transmission mode
  Transmission and reception is carried out in this mode.
- Transmission check mode (for prodiction line)
  Test is carried out in regard to communication performance.
- Adjust reading mode
  This procedure must be performed when there is partial failure in the scanned image. And on replacement of the image sensor or control board.
  Make sure that the glass surface of the image sensor is clean.

(1) Make sure that the battery switch of the control PWB is ON.
The switch is ON if it is on the right side as seen from board inserting direction.
(2) Set a white sheet of paper of 1.57" x 9.06" (4 x 23cm) on the sensor scanner area and close the panel.
The sheet must be made of paper which can cover the sensor and must be smooth, free of folds, creases and dog ears.
(3) Set the machine in the diagnostic mode and press the START key.
(4) When the unit beeps, remove the paper, the adjustment is complete.

## [3] TROUBLESHOUTING

Refer to the following actions to troubleshoot any of problems mentioned in 1-6.

[1] A communication error evoked.
[2] Image distortion produced.
[3] Overseas communication not enabled.
[4] Image distortion occurs when communicating with a G2 model.
[5] Communication with a G2 model is disabled (a communication error evoked).
[6] Communication speed slow liable to fallback.

- Increase the transmission level DSW1-LIU
  Good results in the case of [1] [2] [3] [4] [5]
- Decrease the transmission level DSW1-LIU
  Good results in the case of [3].
- Apply line equalization soft switch 2-5, 6
  Good results in the case of [1] [2] [3] [4] [5] [6]
- Slow down the transmission speed soft switch 2-7, 8
  Good results in the case of [2] [3].
- Replace the LIU PWB.
  Good results in all cases.
- Replace the modem PWB.
  Good results in all cases.
- Replace the control PWB.
  Good results in all cases.

  If problem still exists, fill out communication problem report, and call sharp tac. The communication problem report can be sent to the sharp technican when he returns your call.

(PLEASE PRINT CLEARLY)

### FACSIMILE COMMUNICATION PROBLEM REPORT

DATE: _____

DEALER NAME: _____ ACCOUNT NUMBER: _____

ADDRESS: _____

CITY: _____ STATE: _____ ZIP: _____

NAME OF PERSON FILLING OUT REPORT: _____

TECHNICAN _____ SALES REPRESENTIVE _____

SHARP MODEL NUMBER: _____ SERIAL NUMBER: _____

SOFTWARE ROM LEVELS: _____

_____

CUSTOMERS (END USER) NAME: _____

ADDRESS: _____

CITY: _____ STATE: _____ ZIP: _____

FAX PHONE NUMBER: _____

NAME OF CONTACT AT CUSTOMERS OFFICE: _____

(Should be someone who can operate the machine and is familiar with problem.)

PHONE NUMBER OF CONTACT AT CUSTOMERS OFFICE: _____

DESCRIPTION OF PROBLEM

SENDING PROBLEM? YES NO DESCRIBE IN DETAIL: _____

_____

_____

_____

_____ (Attach additional pages if needed.)

DOES PROBLEM OCCUR IN AUTODIAL MODE? YES NO

DOES PROBLEM OCCUR WHEN SENDING MANUALLY? YES NO

RECEIVING PROBLEM? YES NO DESCRIBE IN DETAIL: _____

_____

_____

_____

_____ (Attach additional pages if needed.)

## FACSIMILE COMMUNICATION PROBLEM REPORT



WHAT HAS BEEN DONE SO FAR (OTHER THAN CALLING THE TAC HOTLINE) TO SOLVE THE PROBLEM?

(Attach additional pages if needed.)

PROVIDE THE FOLLOWING INFORMATION FOR EACH LOCATION YOU ARE HAVING PROBLEMS COMMUNICATIONG WITH:

MAKE & MODEL NUMBER: _____

FAX PHONE NUMBER: _____

PHONE NUMBER OF CONTACT: _____

CITY & STATE: _____

PROBLEM IS SENDING TO / RECEIVING FROM THIS LOCATION.

(Circle one.)

MAKE & MODEL NUMBER: _____

FAX PHONE NUMBER: _____

PHONE NUMBER: _____

PHONE NUMBER OF CONTACT: _____

CITY & STATE: _____

PROBLEM IS SENDING TO / RECEIVING FROM THIS LOCATION.

(Circle one.)

## FACSIMILE COMMUNICATION PROBLEM REPORT



MAKE & MODEL NUMBER: _____

FAX PHONE NUMBER: _____

PHONE NUMBER: _____

PHONE NUMBER OF CONTACT: _____

CITY & STATE: _____

PROBLEM IS SENDING TO / RECEIVING FROM THIS LOCATION.

(Circle one.)

MAKE & MODEL NUMBER: _____

FAX PHONE NUMBER: _____

PHONE NUMBER OF CONTACT: _____

CITY & STATE: _____

PROBLEM IS SENDING TO / RECEIVING FROM THIS LOCATION.

(Circle one.)

MAKE & MODEL NUMBER: _____

FAX PHONE NUMBER: _____

PHONE NUMBER OF CONTACT: _____

CITY & STATE: _____

PROBLEM IS SENDING TO / RECEIVING FROM THIS LOCATION.

(Circle one.)

MAKE & MODEL NUMBER: _____

FAX PHONE NUMBER: _____

PHONE NUMBER OF CONTACT: _____

CITY & STATE: _____

PROBLEM IS SENDING TO / RECEIVING FROM THIS LOCATION.

(Circle one.)

Attach additional pages if needed.

Supplement-3 Line equalizer setup method

Occurrence of any trouble mentioned in Items [1] to [6] in the preceding page may be corrected when frequency compensation is applied using the line equalizer.
Set the dip switch to the proper setting to attain proper compensation.

(1) Call your nearest telephone office and check the following:
1) Size of core line of the line.
2) Line type.
3) Distance from the telephone station to your installation location.

(2) Set the dip switches 2-7 and 2-8 in reference to the tables below (table of constant for the non-loaded cable line) (dip switch setup table).

Example: If (1) the core line size is $\phi$ 0.9 mm, (2) line type is S, and (3) distance is 10 Km;
1) Obtain the attenuation constant between 2.5 KHz and 0.8 KHz, according to the table below.
2) As the attenuation constant is 1.16 for a 2.5 KHz, it can be expressed in terms of dB in the following manner:
Constant at 2.5 KHz is 1.16 . . . . . 1.16 x 10 Km = 11.6dB
Constant at 0.8 KHz is 0.70 . . . . . 0.70 x 10 Km = 7.0dB
3) Subtract the dB value at 0.8 KHz from the dB value at 2.5 KHz. The difference is therefore 4.6dB.
4) Consult the table below for dip switch settings at 2.6dB. Whereas, the dip switch 2-7 must be set ON and 2-8 OFF.

**User switch setup**

| Nominal | SW-2-6 | SW2-5 | Difference between 0.8 and 2.5 KHz |
|---|---|---|---|
| 1.8 km | ON | OFF | Above 2.5 to 5.0 dB |
| 3.6 km | OFF | ON | Above 5.0 to 9 dB |
| 7.2 km | ON | ON | Above 9 dB |

**Line constant for non-load cable line**

| Kind | Core wire size | Line type | DC resistance (0hm/km loop) | Static capacity (m$\mu$F/km) | Attenuation constant | | |
|---|---|---|---|---|---|---|---|
| | | | | | at 0.8kHZ (dB/km) | at 1.6kHz (dB/km) | qt 2.5kHz (dB/km) |
| [Local cable] | | | | | | | |
| | 0.32 | S | 470 | 50 | 2.02 | 2.76 | 3.54 |
| | 0.4 | S | 295 | 50 | 1.62 | 2.20 | 2.82 |
| | 0.5 | S | 187 | 50 | 1.29 | 1.75 | 2.23 |
| | 0.65 | S | 113 | 50 | 0.98 | 1.33 | 1.69 |
| | 0.9 | S | 58 | 50 | 0.70 | 0.93 | 1.16 |
| [Remote cable] | | | | | | | |
| | 0.65 | S | 113 | 38.5 | 0.86 | 1.16 | 1.46 |
| | | P | 56.8 | 104 | 1.03 | 1.40 | 1.78 |
| | 0.9 | S | 58 | 38.5 | 0.61 | 0.81 | 1.00 |
| | | P | 29 | 1.4 | 0.74 | 0.99 | 1.24 |

NOTE:
S indicates the side line and P the light load line.

## [4] ERROR CODE TABLE

### G3 Transmission

| Code | Final received signal | Error Condition (Receiver side) |
|---|---|---|
| 1 | NSF, DIS | Cannot recognize DCS signal by echo etc.<br>Cannot recognize NSS signal (FIF code etc) |
| 2 | CFR | Disconnect line during reception (carrier missing etc) |
| 3 | FTT | Disconnect line by fall back |
| 4 | MCF | Disconnect line during reception of multi page<br>Cannot recognize NSS, DSC signal in the case of mode change |
| 5 | PIP or PIN | No response in receiver side to picture signal after no response in transmitter side to receive TALK mode request |
| 6 | RTN or RTP | Cannot recognize NSS, DCS signal after transmit RTN or RTP signal. |
| 7 | No signal or DCN | No response in receiver side or DCN signal received* (transmitter side) |

### G3 Reception

| Code | Final received signal | Error Condition (Transmitter side) |
|---|---|---|
| 1 | NSS, DCS | Cannot recognize CFR or FTT signal<br>Disconnect line during transmission (line error) |
| 2 | NSC, DTC | Cannot recognize NSS signal (FIF code etc) |
| 3 | EOP | Cannot recognize MCF, PIP, PIN, RTN, RTP signl |
| 4 | EOM | Cannot recognize MCF, PIP, PIN, RTN, RTP signal in the case of mode change |
| 5 | MPS | Cannot recognize MCF, PIP, PIN, RTN, RTP signal in the case of multi page |
| 6 | PR1-Q | Cannot recognize PIP, PIN signal in the case of TALK request |
| 7 | No signal or DCN | No response in transmitter (can not recognize DIS signal) or DCN signal received* (receiver side) |

Error Code (2)

### G2 Transmission

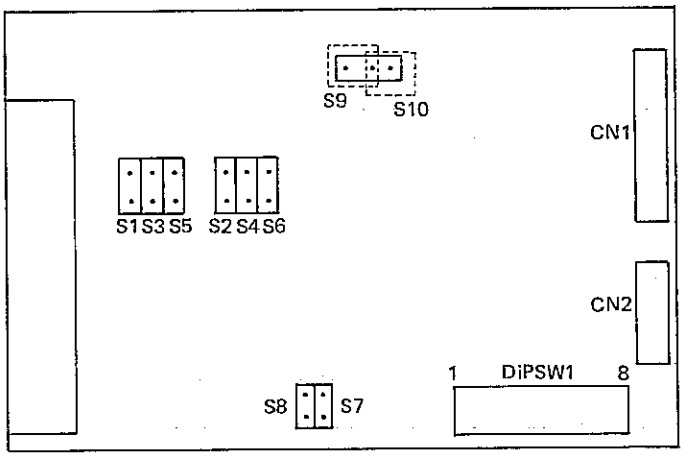
| Code | Final received signal | Error Condition (Receiver side) |
|---|---|---|
| 1 | GI | Cannot recognize GC signal |
| 2 | GFR | Disconnect line during reception<br>Cannot recognize MCF signal* (transmitter side) |
| 4 | MCF | Cannot recognize GC signal in the case of multi page |
| 7 | PIS | The receiver side stop |

### G2 Reception

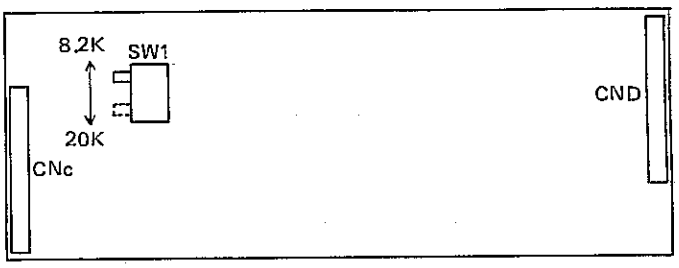
| Code | Final received signal | Error Condition (Transmitter side) |
|---|---|---|
| 1 | GC | Disconnect line during transmission<br>Cannot synchronige* (receiver side) |
| 2 | PHS | Disconnect line during transmission<br>Cannot synchronige during picture reception* (receiver side) |
| 4 | EOM | Cannot recognize GC signal in the case of multi page |
| 7 | PIS | The transmitter side stop |

## [5] SETTING FOR DIFFERENCIATION BY MARKET

LIU PWB




MODEM I/F PWB

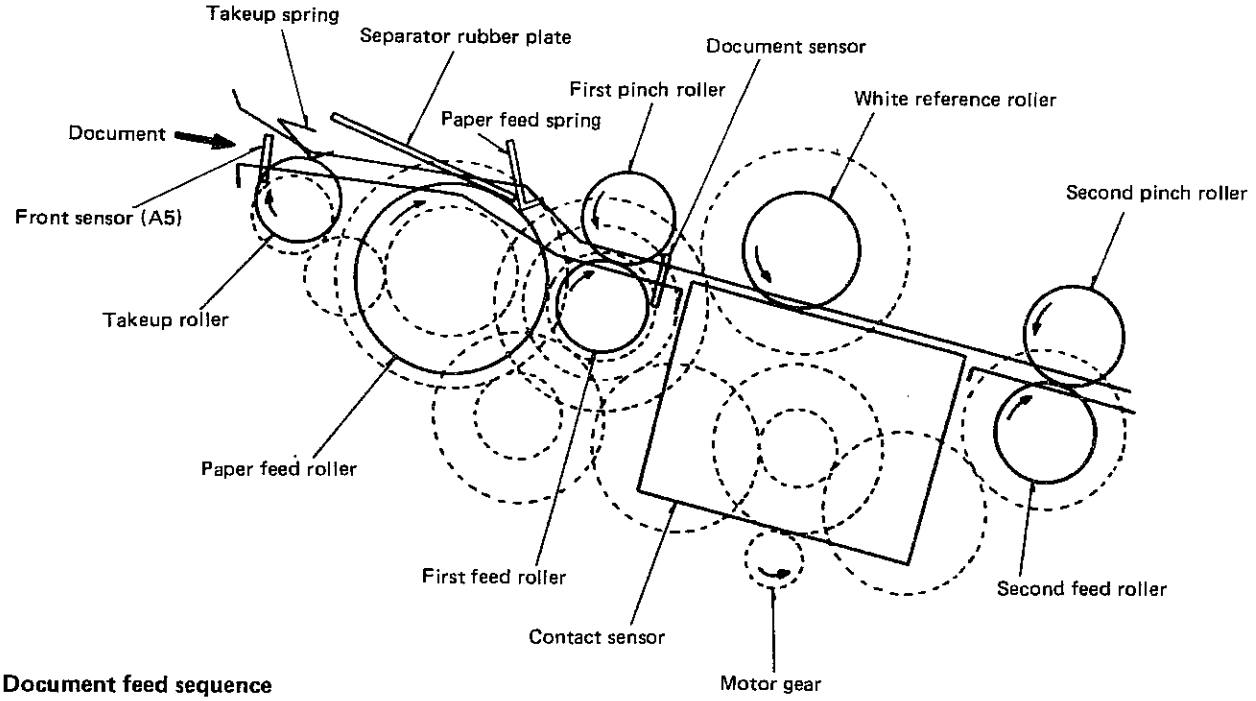



| MARKET | W. Germany | Austria | Finland | Denmark | Sweden | Norway | Netherland (Holland) | Spain | Portugal | Switzerland | Italy | Belgie | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LIU PWB DC RESISTANCE | (180Ω) S7 | (180Ω) S7 | (180Ω) S7 | (180Ω) S7 | (180Ω) S7 | (75Ω) S8 | (180Ω) S7 | (75Ω) S8 | (75Ω) S8 | (75Ω) S8 | (75Ω) S8 | (75Ω) S8 | S7 . . . 180Ω (R1)<br>S8 . . . 75Ω (R5) |
| LIU PWB RINGING Impedance | 33kΩ 0.47μF S1, S2 | 33kΩ 0.47μF S1, S2 | 10kΩ 0.47μF S3, S4 | 33kΩ 0.47μF S1, S2 | 33kΩ 0.47μF S1, S2 | 33kΩ 0.47μF S1, S2 | 33kΩ 0.47μF S1, S2 | 10kΩ 0.47μF S3, S4 | 10kΩ 0.47μF S3, S4 | 10kΩ 0.47μF S3, S4 | 10kΩ 0.47μF S3, S4 | 1kΩ 47μF S5, S6 | S3 . . . 0.47μF/250V<br>S1, S2 33kΩ (R2, R3)<br>S3, S4 10kΩ (R10, R12)<br>S5, S6 4.7kΩ (R11, R13) |
| LIU PWB Over Voltage Protection | Non Varistor S9 | Non Varistor S9 | Add S10 | Add S10 | Add S10 | Add S10 | Non Varistor S9 | Add S10 | Add S10 | Non Varistor S9 | Add S10 | Non Varistor S9 | VARISTOR SVRI . . . VR61S<br>S9 . . . Non<br>S10 . . Add |
| LIU PWB TX Level DIP SW | −6.5dBm ALL OFF | −6.5dBm ALL OFF | −10dBm 3-ON | −10dBm Max. 3-ON | −10dBm Max. 3-ON | −10dBm Max. 3-ON | −6.5dBm ALL OFF | −6.5dBm ALL OFF | −6.5dBm ALL OFF | −6.5dBm ALL OFF | −6.5dBm ALL OFF | −6.5dBm ALL OFF | DIPSW . . . SW1 |
| Control PWB (MODEM I/F PWB) RX Level | (−46dBm) 8.2kΩ | (−46dBm) 8.2kΩ | (−46dBm) 8.2kΩ | (−46dBm) 8.2kΩ | (−46dBm) 8.2kΩ | (−43dBm) 8.2kΩ | (−40dBm) 8.2kΩ | (−46dBm) 8.2kΩ | (−46dBm) 8.2kΩ | (−46dBm) 8.2kΩ | (−46dBm) 8.2kΩ | (−46dBm) 8.2kΩ | MODEM I/F PWB SW1 |
| Soft SW CI detection | (0, 0) | (0, 0) | (1, 1) | (1, 1) | (1, 1) | (1, 1) | (0, 1) | (1, 1) | (1, 1) | (1, 1) | (1, 1) | (1, 1) | Soft SW2 − 3, 2 |

# Chapter 3 Mechanical section description

## [1] MECHANICAL BLOCK

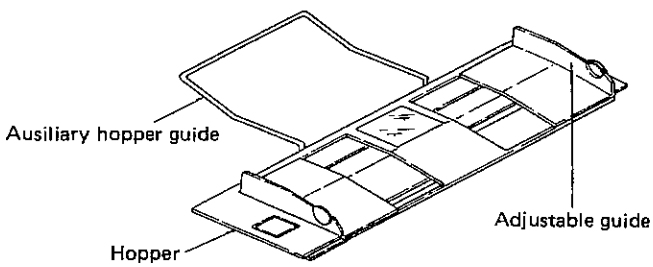
### 1. Document feed system operation and configuration




#### 1-1. Document feed sequence

1) Documents in the hopper is fed into the machine by means of the takeup and feed rollers driven by the pulse motor when the front sensor is actuated, and the lead edge of the document stops when it reaches the document sensor.
2) The document begins to scan after the given number of pulses are received from the document sensor actuated by the leading edge of the document.
3) The document is ejected after the given number of pulses are received from the document sensor deactuated by the trailing edge of the document.
4) If the front sensor is active when the trailing edge of the document passes over the document sensor, that is another document is in the the document hopper, the control goes into action to take up the next document. If the front sensor is not active, that is another document is not in the document hopper, the operation stops after ejection of the document

### 2. Hopper mechanism



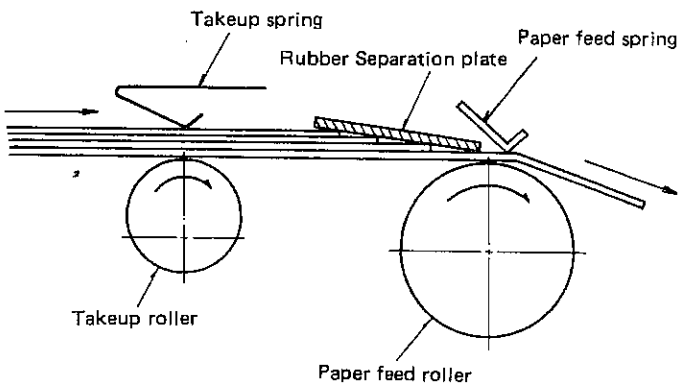

(The ausiliary hopper guide inserted and held in the top cover.)

The hopper is used to align documents to be fed straight into the machine and the adjustable guides are used to align documents according to the paper width.

### 3. Automatic document feed

#### 3-1. Specification

1) Positive means of paper transfer is implemented by the use of the takeup roller along with the paper separation rubber plate. An eccentric roller is used with the takeup roller to assure smooth paper feed. Use of a plate spring to the paper feed roller assures smooth feeding of document.
2) Document separation method:
Rubber separation plate.



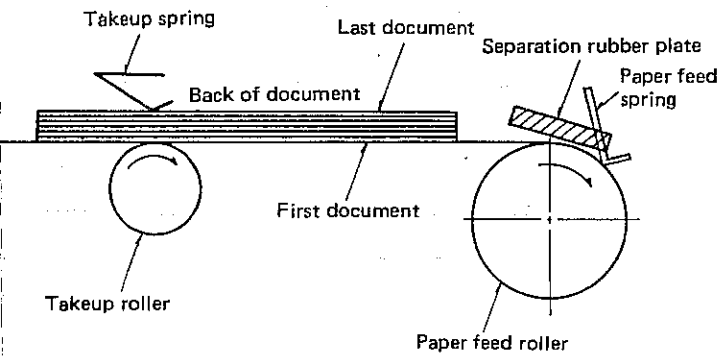

#### 3-2. Documents applicable for automatic feed

| | 4 x 6 size (32.2" x 43.0" x 1000 sheets) (788 x 1091mm x 1000 sheets) series | | Square meter series | |
|---|---|---|---|---|
| | Minimum | Maximum | Minimum | Maximum |
| Paper weright | 99.6 lbs (45 kg) | 199.0 (90 kg) | $0.07 \times 10^{-3}$ lbs/inch$^2$ (52 g/m$^2$) | $0.15 \times 10^{-3}$ lbs/inch$^2$ (104 g/m$^2$) |
| Paper thickness | 0.0024" (0.06mm) | 0.047" (0.12mm) | 0.0024" (0.06mm) | 0.0047" (0.12mm) |
| Paper size | B6 (5.04" x 7.17") (128 x 182mm) to A4 (8.3" x 11.7") (210 x 297mm), letter (8.5" x 11.0") (216 x 279mm) | | | |
| Paper quality | High quality paper | | | |

Documents between 199lbs, 90kg (104 g/m²) to 299lbs, 135kg (157 g/m²) can be inserted manually.
A document above 299lbs (135kg) must be copied by the copier machine before sending it on the facsimile.

### 3-3. Document loading method

1) Check the document to be transmitted if its thickness is suitable for the feed mechanism and free from creases, dog-ears, curl, wet glue, wet ink, paper clips, staplers, and pins.
2) Set documents face down in the document hopper.
i) Adjust the guides to the width of the document.
ii) Align the leading edges of documents and slowly push pages in through the slit until it begins to be taken up. Although the document is being taken up, it is just a preliminary action, and is not transmitting.



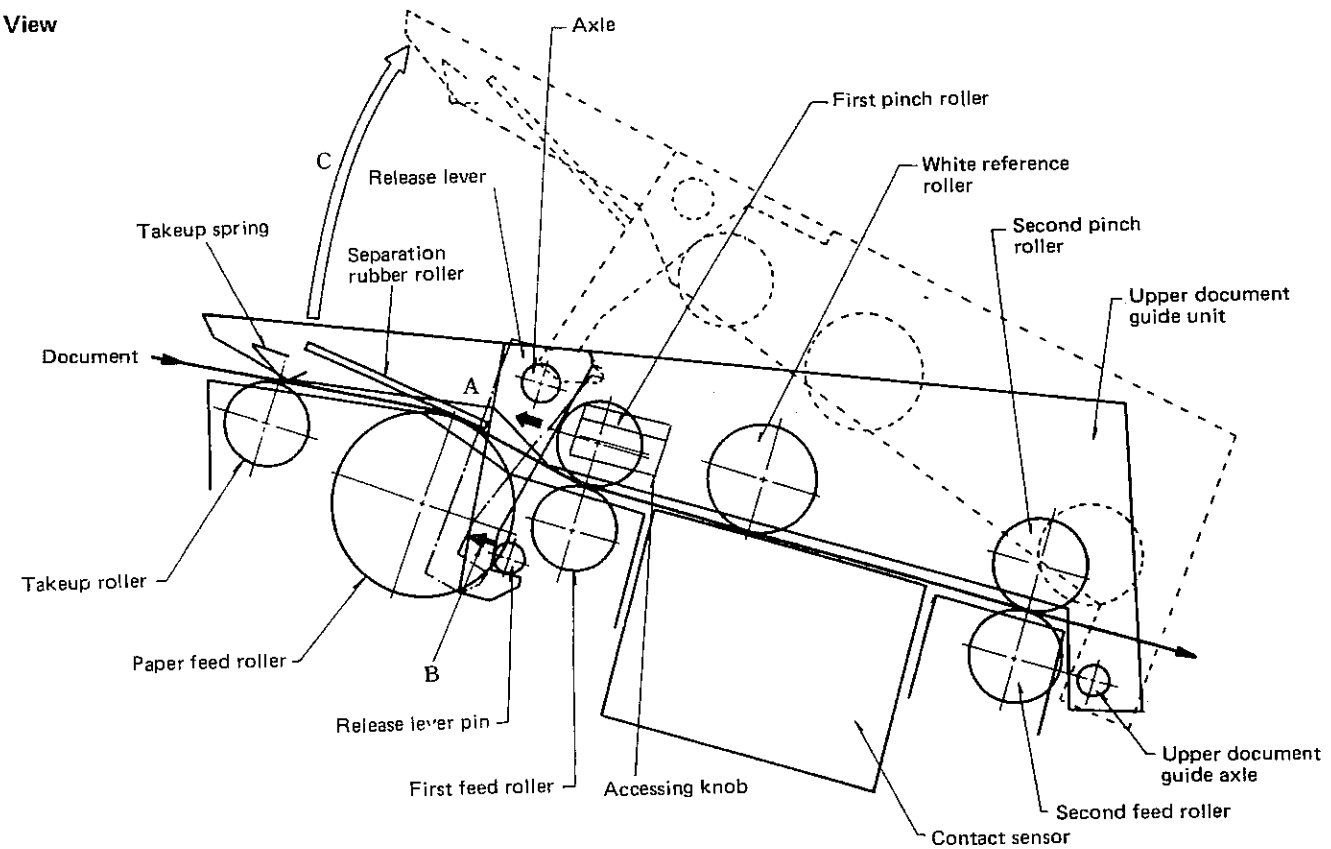

NOTES:
1) The document whose leading edge is curling must be straighten.
2) Do not load documents differing in their sizes and thickness at the same time as skew problems and other feed problems can result.

### 3-4. Documents requiring the use of the carrier sheet

1) Small size document under B6 (5.04" x 7.17") (128 x 182mm)
2) Extra thin document less than 0.0024" (0.06mm) thick
3) Document containing creases, dog-ears, or curls, especially curl on the surface. (Maximum allowable curl is 0.20" (5mm).
4) Document with tears
5) Carbon backed document (carbon side must be covered with a white sheet to avoid transfer of carbon to the carrier sheet).
6) Those written by an easily separable dye material (e.g. tracing paper written on with soft, heavy lead pencil.
7) Transparent document
8) Documents coated on both sides such as leaflets, etc.
9) Folded documents or with glued attachments.
10) Recording paper from the fax unit.

## 4. Document release

### 4-1. View

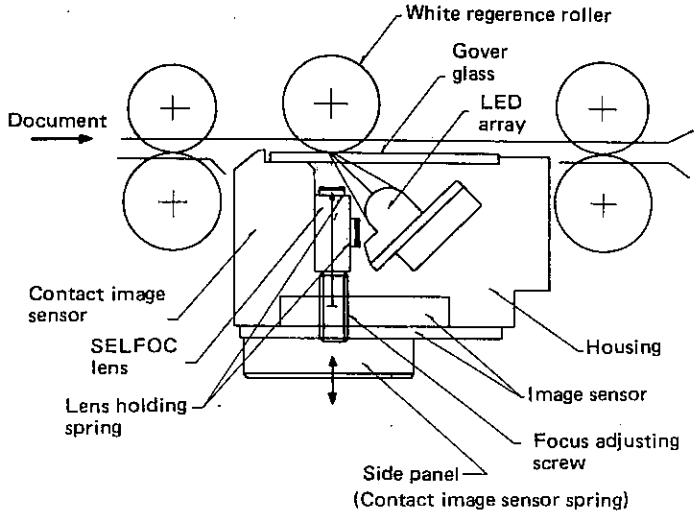



### 4-2. General

When the release button interlinked with the release lever is pressed in the arrow direction A, the release lever moves in the arrow direction B around the axle. The lock of the release lever pin is released so that the upper document guide moves in the arrow direction C around the axle. Then, it becomes possible to remove the document from the machine that has been fed through the rollers, contact sensor, takeup spring, separator rubber plate, first pinch roller, second pinch roller, and white reference roller.

## 5. Optical system

### 5-1. View




### 5-2. General

- The optical system consists of the contact image sensor, white reference roller, document feed system, and the read image signal processor.
- The contact image sensor consists of the LED array, lens, image sensor, and cover glass.
- The contact sensor is not field adjustable, do not disassemble, it is replaced as a complete unit.

### 5-3. Contact image sensor

Light source
Light is exposed over the document from the LED array.

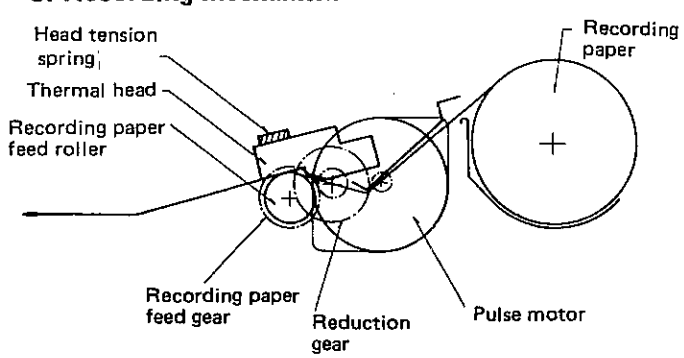
Lens
The light reflected from the document is condensed over the image sensor to scan image using the SELFOC lens.
NOTE:
The screws on both sides of the image sensor PWB are for focus adjustment. Never loosen them under any situation.

Image sensor
Intensity of the light reflected from the document is received by the photodiode of the same size and converted into corresponding electrical charge rate. As it sent out through the thin film transistor (poly-si TFT), the serial image information is converted into analog voltage output.

Cover glass
The dust preventive cover glass is attached to the contact image sensor unit and held tightly against the white reference roller using spring force.
The following points must be checked when a read failure is met.

1) Check the contact image sensor if it makes up and down movement smoothly and returns to the original position.
2) Check the white reference roller for dirty condition.
3) Check the contact image sensor unit cover glass for dirty condition.

## 6. Recording mechanism




### 6-1. Drive system

Rotation of the receiver pulse motor is conveyed to the recording paper feed roller via the pulse motor shaft gear, reduction gear, and the recording paper feed gear to feed the recording paper.

### 6-2. Recording

As the thermal head is used for recording, it permits easier machine maintenance and less running costs.

1) Thermal head
The thermal head consists of 1728 dots heat generating elements arranged on a row and it has a resolution of 8 dots/mm. It has a maximum recording speed of 10 ms/line. It incorporates the driving circuit that has 1728 shift register latch and output controller, and it features low power consumption as divided into eight blocks. The thermistor output and dip switch type rotary switch on the control PWB detects the head heat sink temperature and controls voltage.
The table shows the relation of the dip type rotary switch output vs. head average resistance, which has been factory set.
After replacement, it requires adjustment for resistance using the pot on the control PWB. The resistance is noted on the label of the head.

| Thermal head average resistance (ohms) | SW setting |
|---|---|
| 569 – 581 | F |
| 582 – 593 | E |
| 594 – 606 | D |
| 607 – 619 | C |
| 620 – 631 | B |
| 632 – 644 | A |
| 645 – 656 | 9 |
| 657 – 669 | 8 |
| 670 – 682 | 7 |
| 683 – 694 | 6 |
| 695 – 707 | 5 |
| 708 – 720 | 4 |
| 721 – 732 | 3 |
| 733 – 745 | 2 |
| 746 – 757 | 1 |
| 758 – 770 | 0 |

2) Recorder configuration
Recording is accomplished by pressing the thermal head onto the recording paper over the paper feed rollers.
Main scan is electronically achieved, while sub-scan is done by feeding the recording paper with the recording paper feed roller
Usually, the cause for an uneven print tone is due to deviation of the thermal head heater line or uneven contact of the head to the roller.
It can be checked in the following manner:

(1) Check if proper movement of the head is not obstructed because of improper routing of the thermal head power supply/signal cable.
(2) Check the screw on the pivot of the sub-frame if it smoothly moves up and down.
(3) Check the thermal head support bracket if it is secured without a play.
(4) Check to see that the recording paper feed roller has proper concentricity, in the case of a print tone variation being evenly repeated down the page.
(5) Replace the head with a new one and check to see if the same trouble occurs.

## [2] MACHINE MAINTENANCE (DISASSEMBLY AND REASSEMBLY PROCEDURES)

NOTES:
- Described in this section are the components that may require replacement for machine maintenance.
- Except for precautions specifically required for reassembly, the normal reassembly procedure is omitted as it can be done in the reverse sequence of disassembly.
- Description is omitted for such as cable clamp, and holder, etc., unless specific cautions are required for disassembly and reassembly. Location of the cable clamp and wiring tie must be noted before disassembly.
- Figure attached to the screw in the illustration represents the tightening torque.

Prerequirements
- Unfasten the ac plug from the wall outlet before begining.

Tools required
- Screwdrivers, small and large
- Phillips tip screwdrivers, small and large
- Long nose pliers
- Wire cutter

### 1. Cabinets

#### (1) Top cover and Power cover

a. Lift up the subframe cover and remove the six screws (B4) that hold the top cover and power cover on the frame, then remove the top cover and power cover from the frame (Fig. 1).

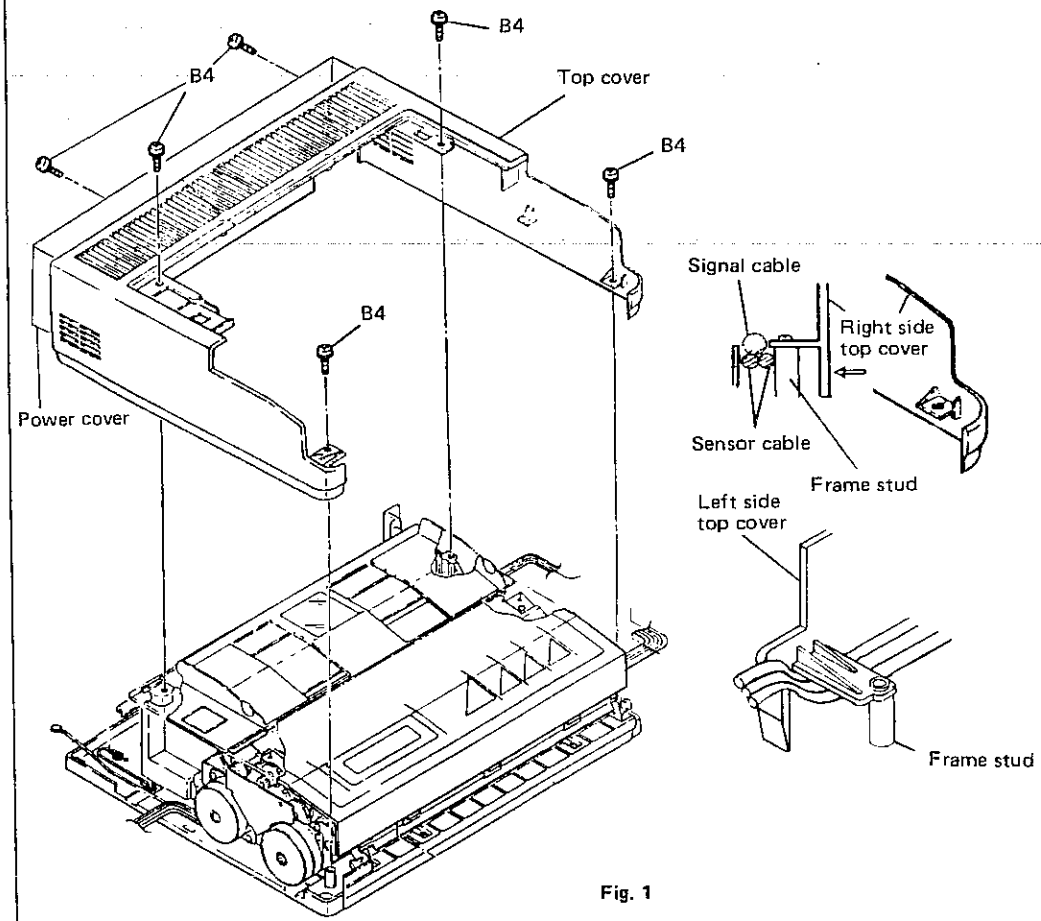



Fig. 1

**REASSEMBLY CAUTION:**
- Pay attention for routing of the wires when installing the top cover on the frame. See the enlarged view in Fig.1 for wire routing.

#### (2) Subframe cover

a. Open the upper document cover assy located on the operational panel unit.
b. Remove the two screws (B1) that hold the subframe cover on the subframe, then remove the subframe cover from the subframe (Fig.2).
c. Remove the knob spring from the subframe and the frame accessing knob (Fig.2).
d. Remove the knob from the subframe (Fig.2).

**REASSEMBLY CAUTIONS:**
- When installing the spring to the subframe and the knob, pay attention not to deform the spring.
- Observe the following sequence to install the subframe cover on the subframe.
  (a) Open the upper document guide assy and insert the left side of the subframe cover first, then insert the right side.
  (b) Insert the two studs of the subframe and one hook into the holes of the recording paper exit plate (Fig.2).
  (c) Note Fig.2. See the cable through the window in the arrowhead Q that the cable is not seized by the subframe and gear.

(d) When securing the subframe cover on the subframe, push the subframe cover in the arrowhead R in Fig.2 and fasten it on the subframe with the two screws (B1).

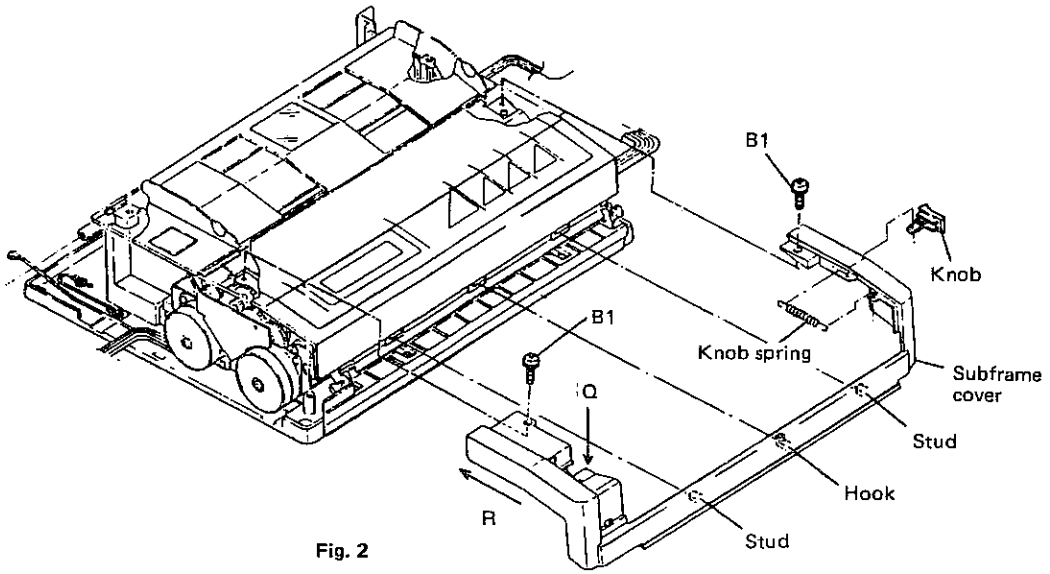



Fig. 2

## 2. Operation panel unit

a. Open the upper document cover assy located on the operational panel unit.
b. Remove the two screws (B1) that hold the operational panel unit on the upper document guide assy then remove the operational panel unit from the upper document guide assy (Fig.3).
c. Unfasten the LCD cable from the connector of the LCD PWB (Fig.3).
d. Remove the ten screws (B2) that hold the LCD module and the switch PWB on the operational panel cabinet, then remove the LCD module and the switch PWB (Fig.3).

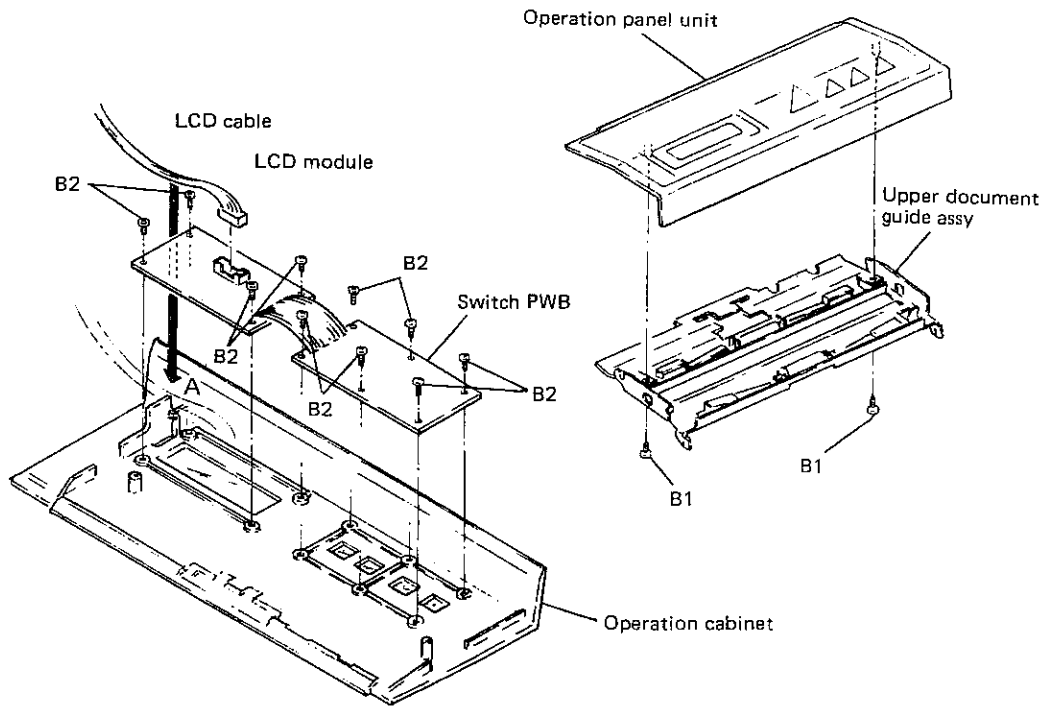



Fig. 3

**REASSEMBLY CAUTIONS:**

- Note the wire routing of the LCD cable. Install the LCD cable along wall A and have a sufficient allowance around the connector area.
- When replacing the face sheet of the operational unit, pay attention not to allow air to remain inside the the top side of the operational cabinet.

## 3. Hopper guide

a. Open the subframe.
b. Remove the two screws (B1) that holds the hopper guide to the subframe. Next, press the two tabs of the hopper guide in the arrowhead A in Fig.4 to remove the hopper guide from the subframe.

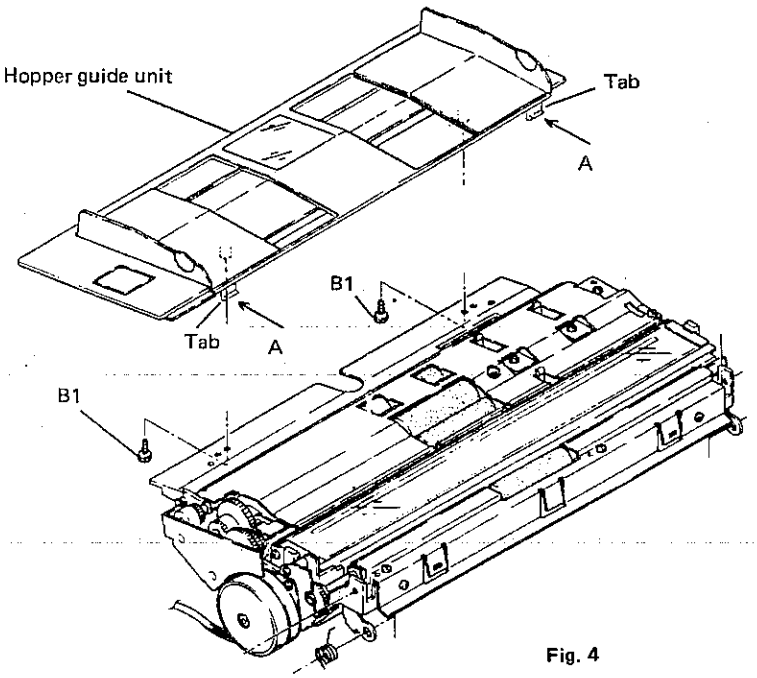



Fig. 4

## 4. LIU PWB

a. Remove the top cover from the frame, in reference to 1-(1)-a.
b. Remove the main cable connector from the LIU PWB (Fig.5).
c. Remove the one screw (B1) that holds the LIU ground strap from the the angle of the power supply unit, then remove the LIU ground strap from the power supply angle (Fig.5).
d. Remove the one screw (B2) that holds the LIU PWB on the frame, then remove the LIU PWB from the frame (Fig.5).

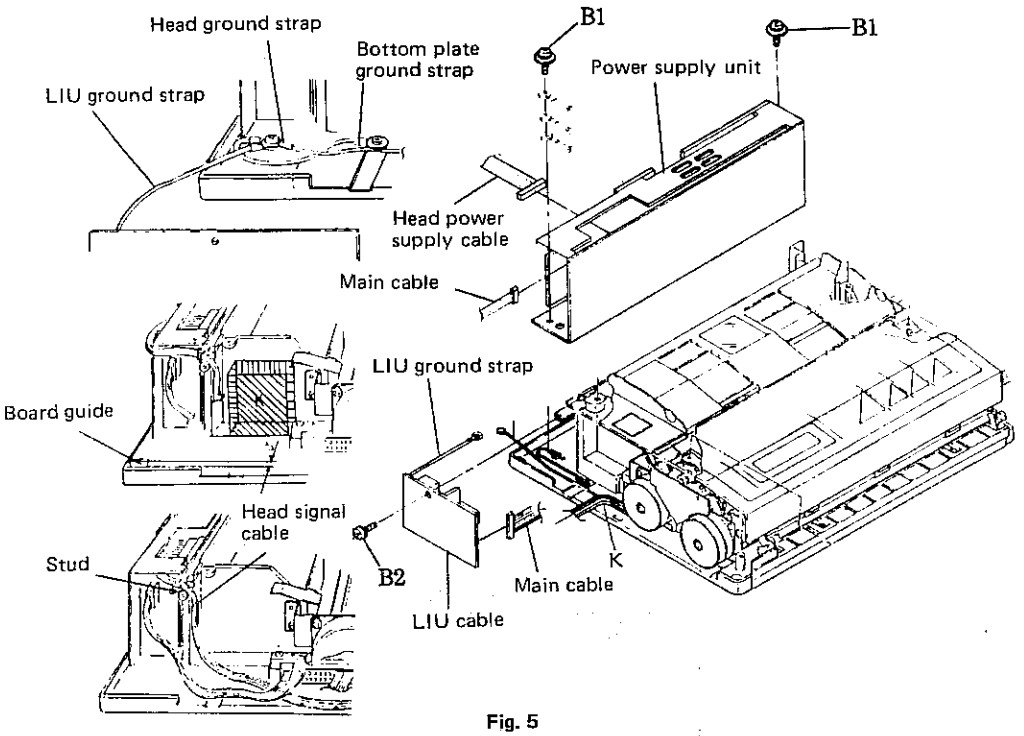


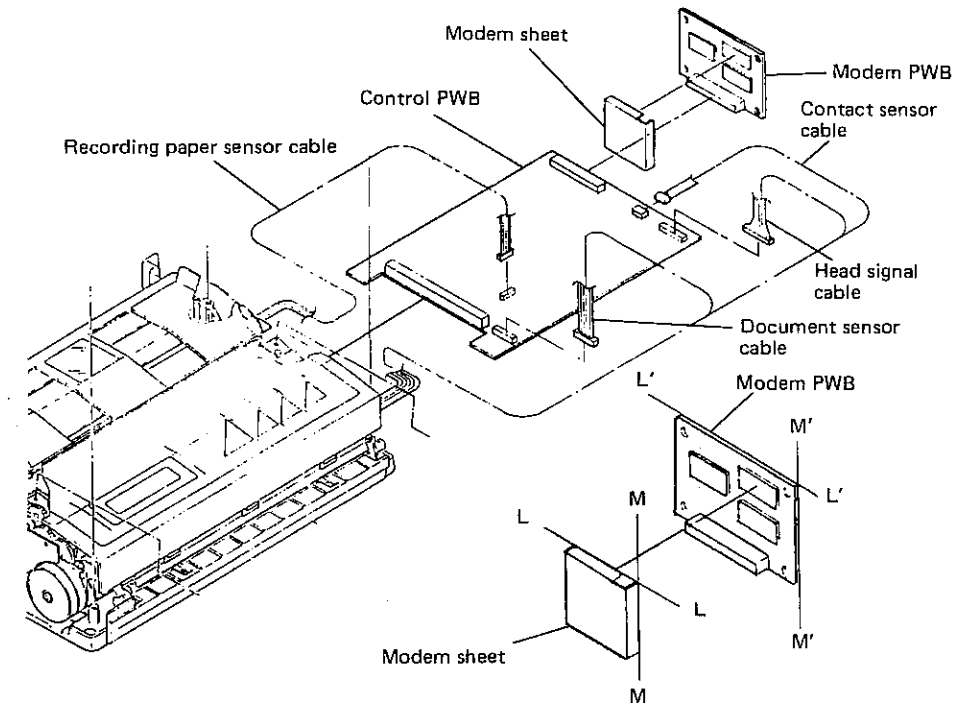

Fig. 5

| | |
|---|---|
| | **REASSEMBLY CAUTIONS:**<br>• Be sure the LIU ground strap, bottom plate ground strap, and the head ground strap are fastened together on the angle of the power supply unit. See the enlarged view in Fig.5 for wiring treatment. Do not allow the ground strap to make contact with the capacitor on the power supply unit.<br>• When installing the LIU PWB on the frame, insert the board into the board guides and secure it on the frame with the screws.<br>• After installing the LIU PWB, the portion of slack cable must be seated in space K, shown in Fig.5, behind the receive motor. |

## 5. Power supply

| | |
|---|---|
| | a. Remove the top cover from the frame, in reference to 1-(1)-a.<br>b. Unfasten the head power supply cable and main cable connectors from the power supply unit (Fig.5).<br>c. Remove the two screws (B1) that hold the power supply unit on the frame, then remove the power supply unit from the frame (Fig.5).<br><br>**REASSEMBLY CAUTIONS:**<br>• Fasten the ground straps of the power supply unit and LIU and treat the wiring in reference to Section 4, LIU PWB, REASSEMBLY CAUTION.<br>• When installing the power supply unit on the frame, make sure that the positioning stud of the frame is in engagement with the hole in the power supply unit.<br>• Route the head power supply cable above the stud of the frame before connection with the power supply unit.<br>• Fasten the main cable with the power supply unit. |

## 6. Modem PWB

| | |
|---|---|
| | a. Remove the top cover from the frame, in reference to 1-(1)-a.<br>b. Remove the modem PWB from the control PWB (Fig.6)<br><br>  <br><br>Fig. 6<br><br>**REASSEMBLY CAUTION:**<br>• When replacing the modem sheet, refer to the enlarged view in Fig.6. Align to L-L' and M-M' to bond the modem sheet, |

## 7. Control PWB

a. Remove the top cover from the frame, in reference to 1-(1)-a.
b. Remove the modem PWB from the control PWB (Fig.6)
c. Unfasten the contact sensor cable and head signal cable connectors from the control PWB (Fig.6).
d. Remove the control PWB to the right side from a clearance between the frame and the bottom plate.
e. Unfasten the recording paper sensor and document sensor cable connectors from the control PWB.

**REASSEMBLY CAUTIONS:**

- When inserting the control PWB between the frame and the bottom plate, pay attention not to hit the recording paper sensor and document sensor cable and their wiring ties with a component on the board.
- After inserting the control PWB, make sure that the recording paper sensor, document sensor, contact image sensor, and head signal cables are situated inside the edge line of the frame.

## 8. Recording paper sensor assy

a. Remove the top cover from the frame, in reference to 1-(1)-a,
b. Remove the modem PWB from the control PWB (Fig.6).
c. Remove the control PWB from a clearance between the bottom plate and the frame, in reference to 7-c to e.
d. Remove the screw that holds the bottom plate ground wire, then remove the bottom plate ground wire from the bottom plate (Fig.5).
e. Remove the four screws (B1) that hold the bottom plate on the frame, then remove the bottom plate from the frame (Fig.7).

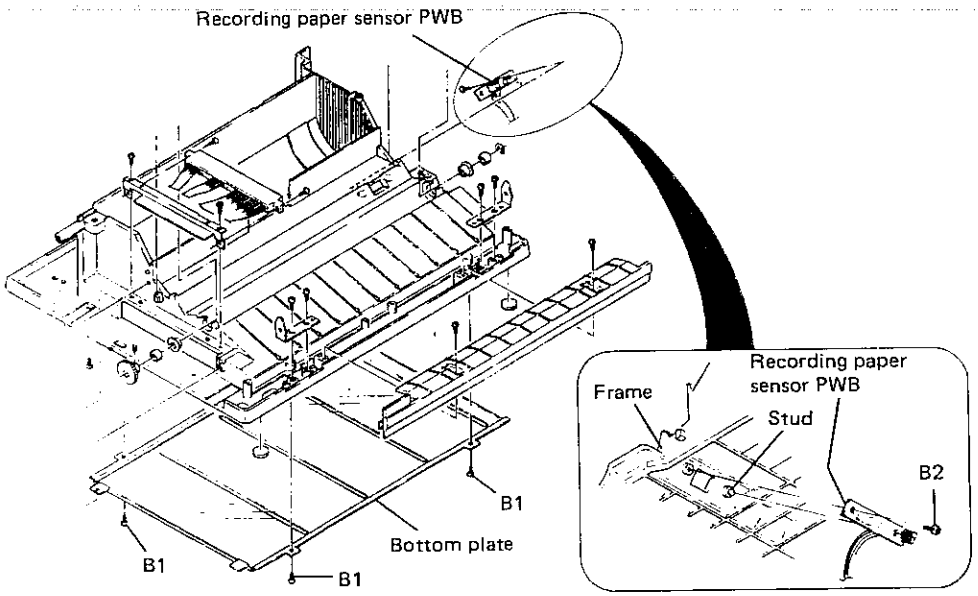



Fig. 7

f. Remove the one screw (B2) that holds the recording paper sensor PWB on the frame, then remove the recording paper sensor PWB from the frame (Fig.7, enlarged view).
g. Remove the one screw (B1) that holds the doorswitch on the right side frame, then remove the doorswitch from the frame (Fig.8).

**REASSEMBLY CAUTIONS:**

- When installing the recording paper sensor PWB on the frame, make sure that the one positioning stud of the frame is in engagement with the hole in the recording paper sensor PWB (Fig.7).
- When installing the doorswitch on the frame, make sure that the one positioning stud of the frame is in engagement with the hole in the doorswitch (Fig.8, enlarged view).
- See Section 7, Control PWB, REASSEMBLY CAUTIONS, for routing of control PWB interfacing cables.

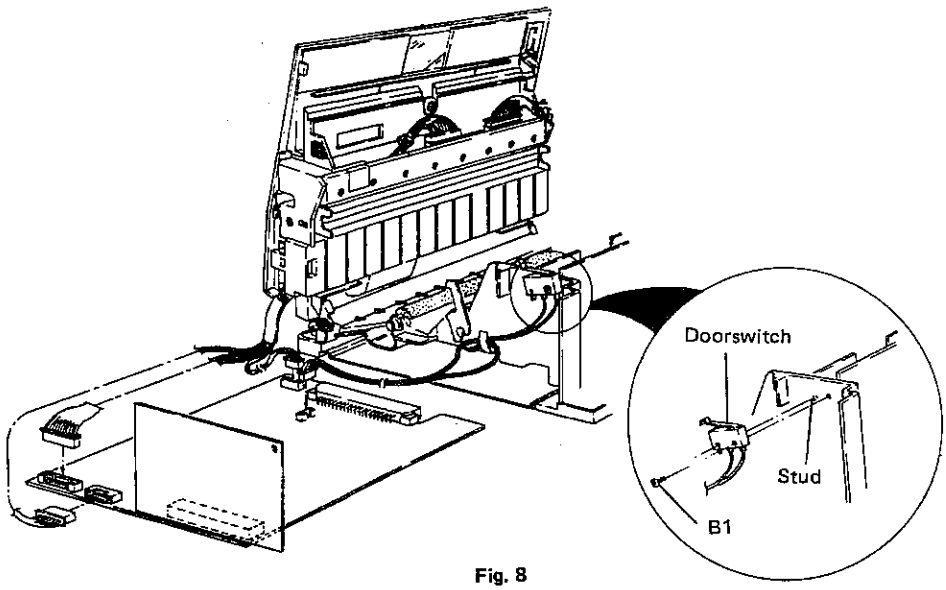



Fig. 8

## 9. Document sensor assy

a. Remove the top cover from the frame, in reference to 1-(1)-a.
b. Remove the control PWB together with the modem PWB from the clearance between the bottom plate and the frame, in reference to 7-c to e.
- The subframe cover must be removed from the subframe, in reference to 1-(2).

c. Open the upper document guide assy.
d. Remove the two screws (B1) and two more screws (B2) that hold the lower document guide on the subframe and the document sensor holding bracket, then remove the lower document guide from the subframe and the document sensor holding bracket (Fig.9).
e. Remove the one screw (B3) that holds the document sensor holding bracket on the subframe, then remove the document sensor holding bracket from the subframe (Fig.9).
f. Remove the two screws (B4) that hold the document sensor and the front sensor PWB on the document sensor holding bracket, then remove the document sensor and the front sensor PWBs from the document sensor holding bracket (Fig.9).

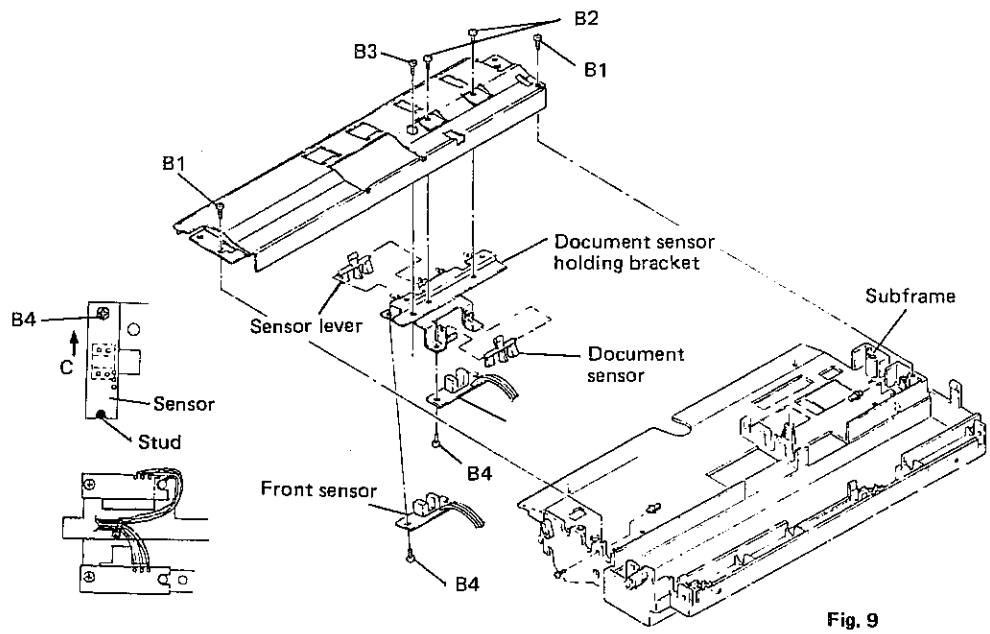



Fig. 9

**REASSEMBLY CAUTION:**

- When installing the document sensor and the front sensor on the document sensor holding bracket, do not install them on the wrong side (Fig.9).
  (a) For identification, check the cable numbers and color.
  * Cable colors and numbers
  Document sensor: Three wires of red, orange, and brown
  Front sensor: Three wires of white, black, and brown

(b) When installing the document sensor and the front sensor PWBs on the bracket, move the boards in the arrow direction C in Fig.9 enlarged view, before securing them with screws.
(c) When routing the wires from the document sensor and the front sensor PWB never permit wire to situate close to the working range of the sensor lever (Fig.9, enlarged view).

* After installing the document sensor PWB and the front sensor PWB, have the following space and thrust play given in Table for the document sensor holding bracket, the sensor lever, and sensor. Ref. Fig.10.

| | Location | Size |
|---|---|---|
| Clearance | C, D, E, F | 0.0079" 0.2mm) min. |
| Thrust play | G, H | 0.0039" ~ 0.0157" (0.1 ~ 0.4mm) |

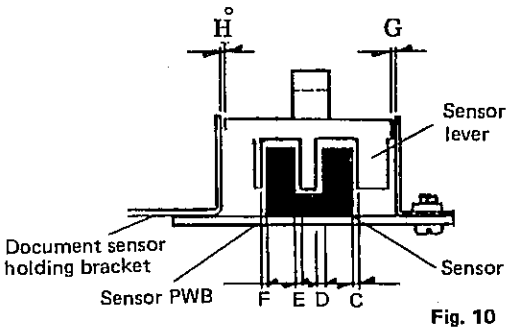



Fig. 10

**NOTE:**
Sections, 1 to 9, describe about disassembly and reassembly procedures and cautions for the external panels and board units.
For sections, 10 to 13, hereafter, description is given assuming the external panels and board units are removed. For the disassembley and reassembly procedures and cautions of the external panels and board units, refer to sections, 1 to 9.

## 10. Upper document guide assy

a. Remove the spring of the release lever (2) assy and remove the lever from the upper document guide (Fig.11).

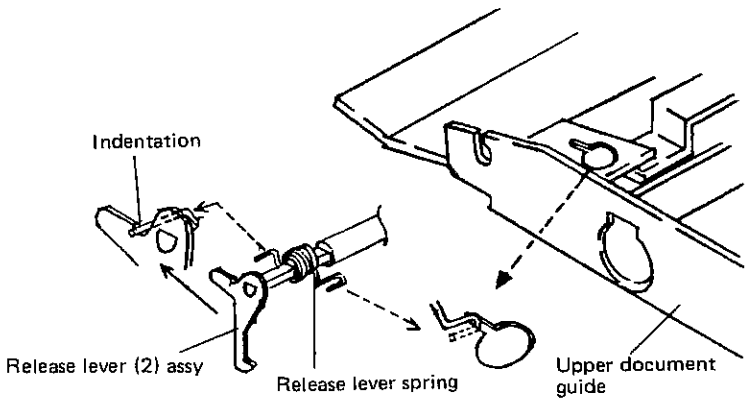



Fig. 11

b. Remove the one screw (B1) that holds the four pinch roller tension spring on the upper document guide, then, remove springs from the upper document guide (Fig.12).
c. Remove the two pinch rollers from the upper document guide (Fig.12).
d. Remove the two paint locked screws (B2) that hold the separation spring and the separation rubber plate on the upper document guide, then, remove the separation spring and the separation rubber plate from the upper document guide (Fig.12).
e. Remove the three E-rings (E4) that hold the white reference roller on the upper document guide, then remove the bushings. Slide the white reference roller to left and remove it from the upper document guide (Fig.12).

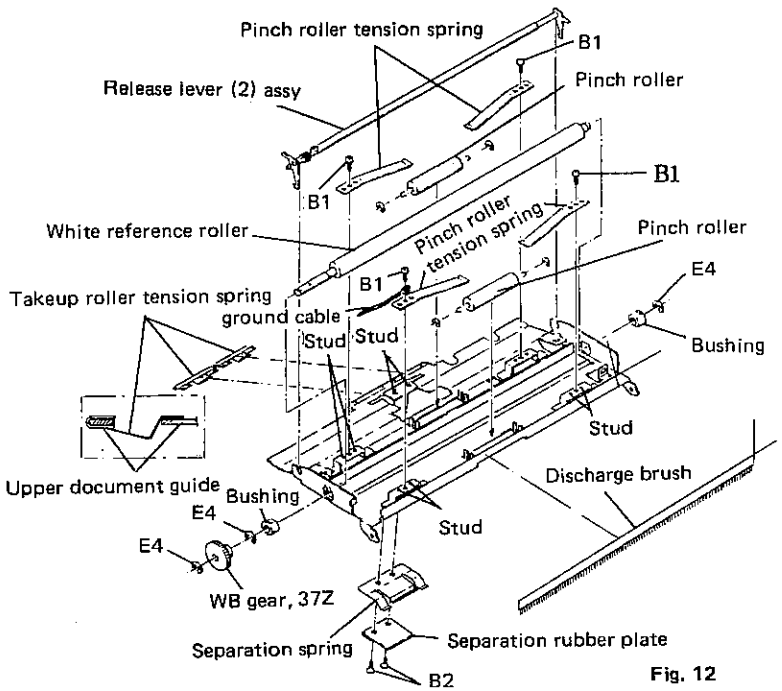



Fig. 12

**IMPORTANT:**

Do not soil the white area of the white reference roller.
If soiled, wipe it clean with alcohol.

f. Remove the two screws (B1) that hold the upper document guide on the subframe, then remove the upper document guide from the subframe (Fig.13).

g. Remove the takeup roller tension spring from the upper document guide (Fig.12).

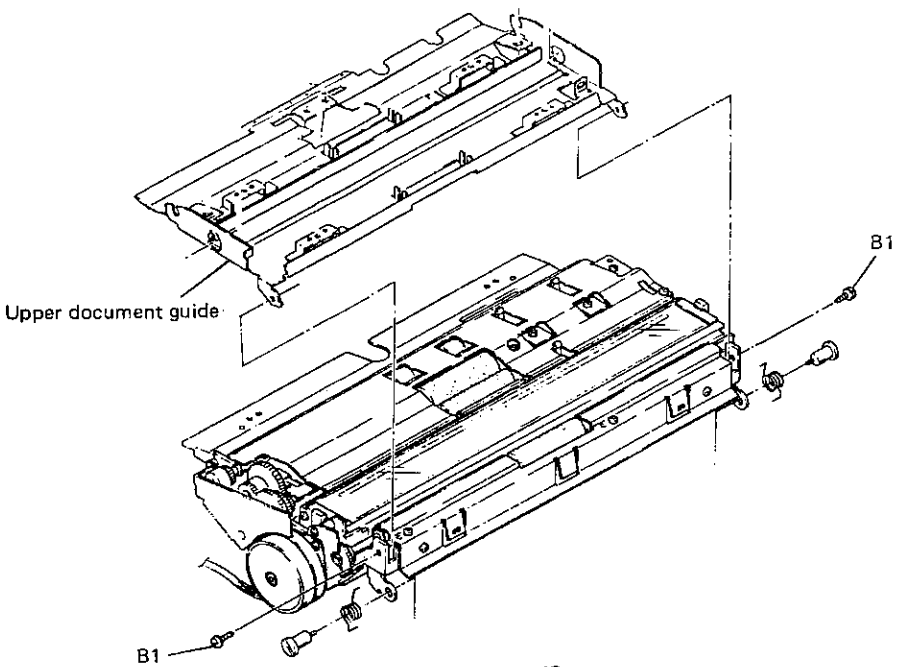



Fig. 13

**REASSEMBLY CAUTIONS:**

- Installing the takeup roller tension spring
  - (a) Note the enlarged view of Fig.12. Open the upper document guide and insert the takeup roller tension spring as illustrated in the figure.
  - (b) After installing the takeup roller tension spring, make sure that the two studs on the upper document guide are engaged with the holes of the spring (Fig.12).
- Pay attention to the following when attaching the discharge brush on the upper document guide (Fig.12).
  - (a) Wipe clean the discharge brush bonding area with alcohol.
  - (b) See Fig.12 for the bonding location of the discharge brush. After bonding, stretch the surface to purge air underneath.

- Pay attention to the following when installing the separation spring and the separation rubber plate on the upper document guide (Fig.12).
  (a) The separation spring and the separation rubber plate must be installed in the order and direction shown in Fig.12. Do not install the parts upside down.
- When installing the four pinch roller tension spring on the upper document guide, insert the holes of the pinch roller tension spring (two) onto the pinch roller tension spring positioning studs and fasten with the screw (B1) (Fig.12).
- When installing the back panel gear 37Z on the white reference roller, pay attention for the installing direction. The flat surface of the gear must face outside (motor side) (Fig.12).
- Never spoil the white area of the white reference roller.
- Observe the following procedure to install the release lever (2) assy (Fig.11).
  (a) Install the release lever (2) assy on the upper document guide.
  (b) Slightly lift up the side of the lever with the spring, engage the the spring hook into the hole, and slide it towards the groove.
  (c) Hook the other end of the spring to the indentation in the release lever.

**CHECK-OUT**

The optical unit must be replaced by the whole assembly, except for replacement of the cover glass. Such as the LED array, sensor unit, lens, etc., can not be replaced as they require adjustment.

a. Remove the contact sensor cable from the control PWB.
b. Remove the optical unit from the tab on the subframe (one each on both sides) (Fig,14).
   * Cover glass replacement
c. Remove the optical unit, in reference to a. and b. above.
d. Remove the four screws (B1) that hold the side plates on the housing, then remove the plates. Next, remove the cover glass from the housing (Fig.14).

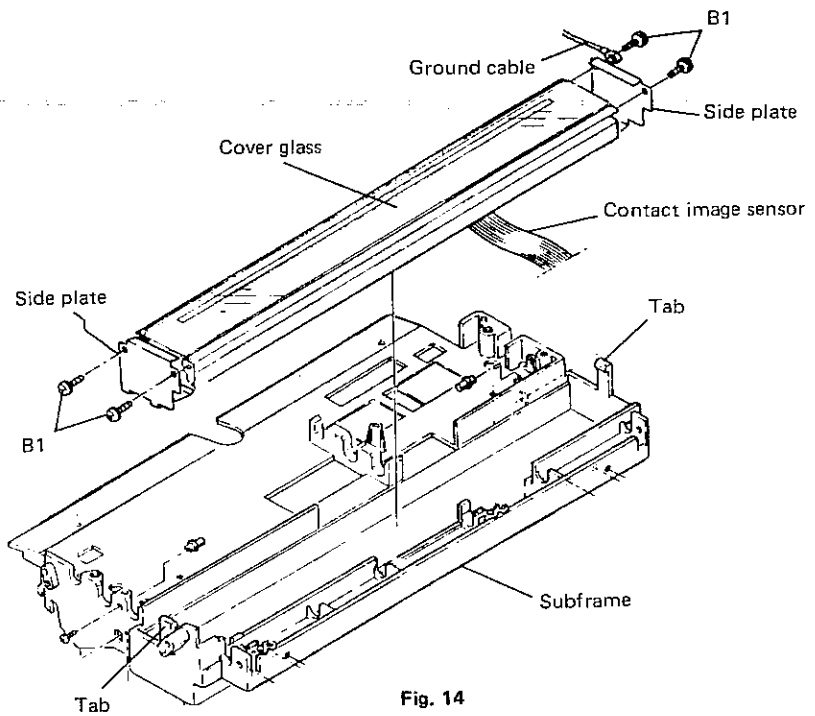



Fig. 14

**REASSEMBLY CAUTIONS:**

- Pay attention to the following when replacing the cover glass.
  (a) Do not let anything fall into the optical unit.
  (b) If the LED array or lens were to be soiled with dust, it has to be wiped clean. (Use soft clean cloth.)
  (c) Wipe both surfaces of the cover glass to clean off dust. (Use soft clean cloth.)
  (d) Ensure that the ground cable has been properly secured.

## 12. Subframe block

| | |
|---|---|
| **(1) Takeup roller, paper feed roller, feed rollers** | a. Remove the two screws (B1) and the two more screws (B2) that hold the lower document guide on the subframe and the document sensor holding bracket, then remove the lower document guide from the subframe and the document sensor holding bracket (Fig.9).<br>b. Remove the two screws (B1) that hold the upper document guide on the subframe, then remove the upper document guide from the subframe (Fig.13).<br>c. Remove the two screws (B1) that hold the recording paper exit plate on the subframe, then remove the recording paper exit plate from the subframe (Fig.15).<br>d. Remove the feed roller-1 and -2 from the subframe (Fig.15). |

**(5) Subframe**

a. Remove the two screws (B1) that holds the upper document guide assy on the subframe, then remove the upper document guide from the subframe (Fig.22).

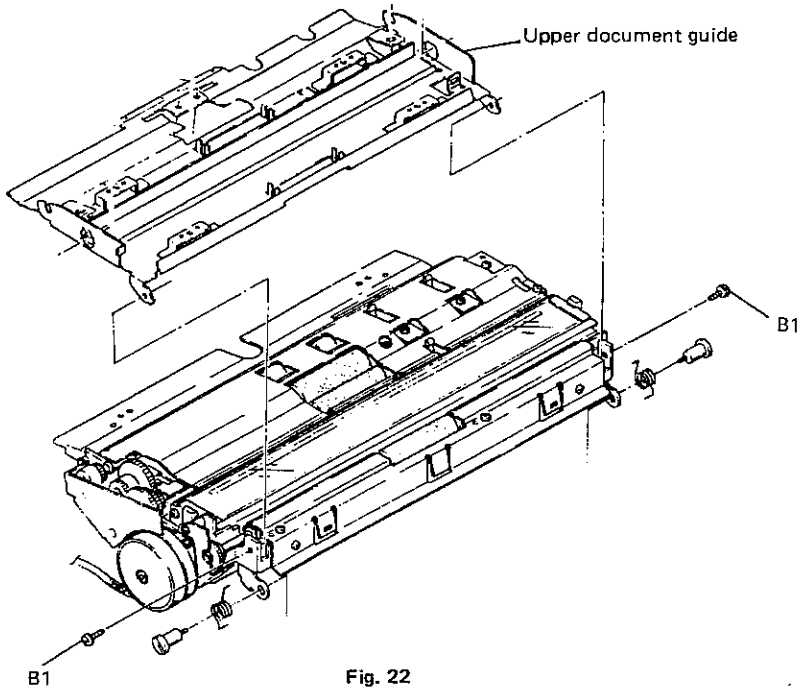



Fig. 22

b. Remove the optical unit from the subframe, in reference to 11-a and b.
c. Remove the takeup roller, paper feed roller, and the feed rollers from the subframe, in reference to 12-(1)-a to g.
d. Remove the document sensor holding bracket (w/sensor PWB) from the subframe.
e. Remove the head cover and the head unit from the subframe, in reference to 12-(15)-a to c.
f. Remove the transmit motor holding bracket (w/motor and gears) from the subframe, in reference to 12-(4)-d.
g. Remove the two screws (B1) that hold the two head tension springs on the subframe, then remove the springs from the subframe (Fig.23).
h. Remove the two screws (B2) that hold the subframe on the frame angle, then remove the subframe from the frame angle (Fig.24).
i. Remove two each screws (B2) that hold the subframe angle on the subframes, then remove the angle from the subframes (Fig.23).

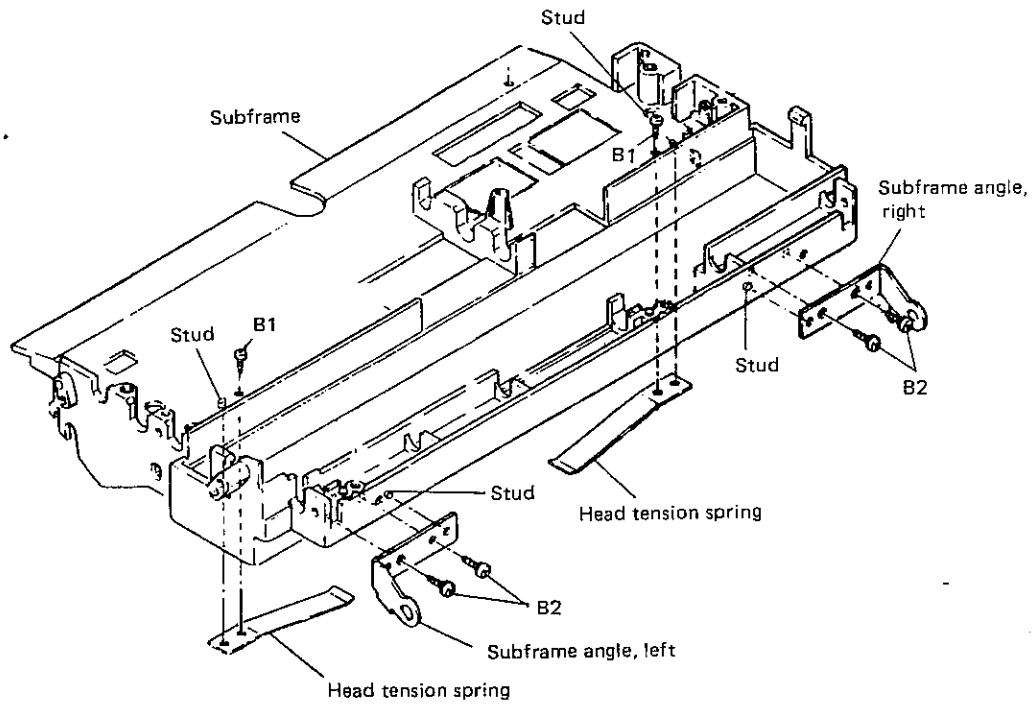



Fig. 23

**REASSEMBLY CAUTIONS:**

- When installing the two head tension springs on the subframe, make sure that the positioning studs are engaged with hole of the spring (Fig.23).
- When installing the subframe angles on the subframe, make sure that the two positioning studs are engaged with two each holes of the subframe angles (Fig.23).
- See Fig.24 for the locations of the frame latch springs.

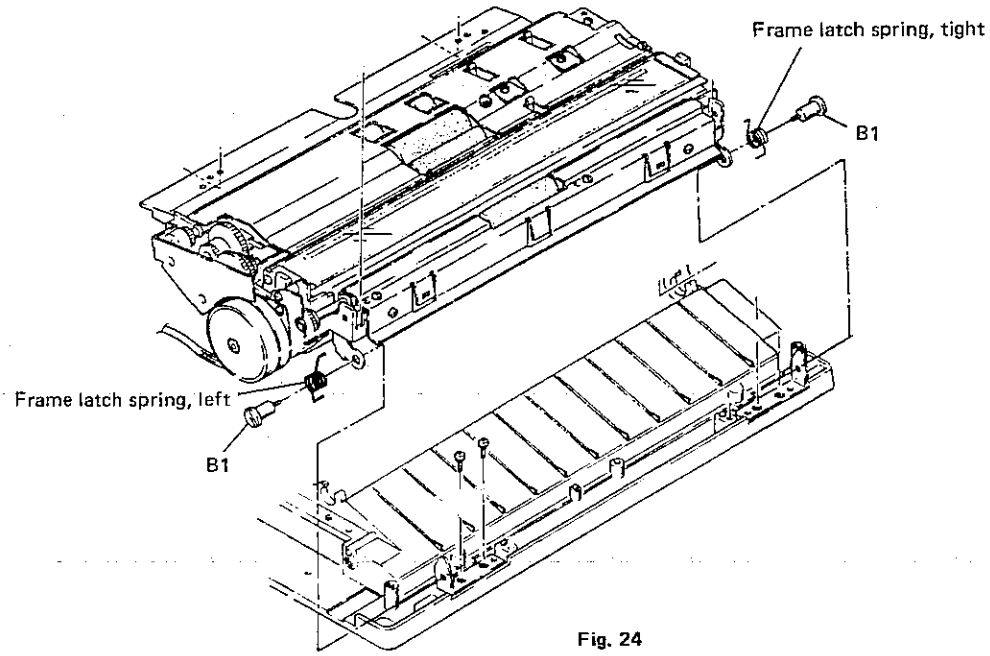



Fig. 24

## 13. Frame block

a. Remove the two screws (B1) that hold the receive motor on the receive motor holding bracket, then remove the two receive motor ground cables from the receive motor holding bracket (Fig.25).
b. Remove the release lever spring (Fig.25).
c. Remove the two screws (B2) that hold the receive motor holding bracket on the frame, then remove the bracket from the frame (Fig.25).
d. Remove the one E-ring (E3) that holds the reduction gear 15Z/42Z on the receive motor holding bracket, then remove the gears from the receive motor holding bracket (Fig.25).

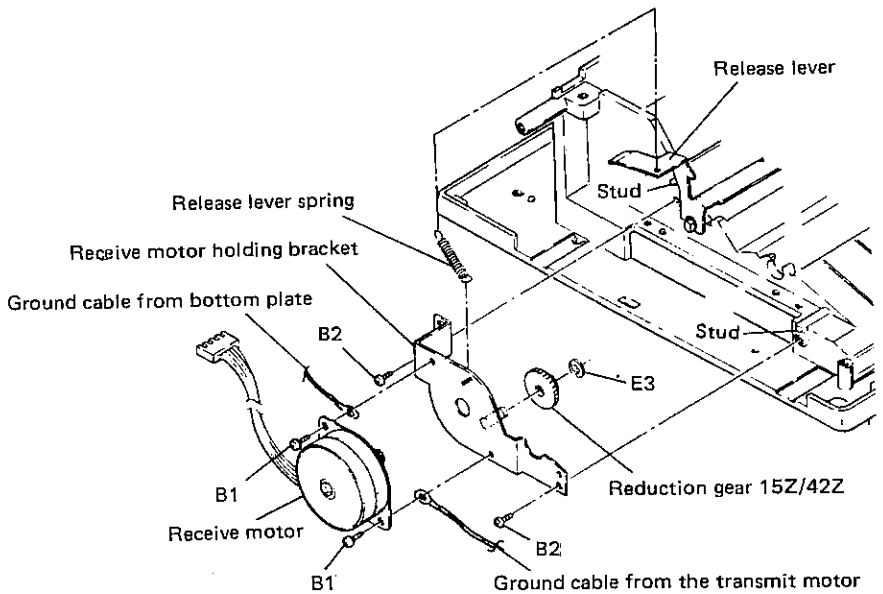



Fig. 25

**REASSEMBLY CAUTIONS:**

- When installing the reduction gear 15Z.42Z on the receive motor holding bracket, pay attention not to install the gears in the wrong position, The larger gear must be on the front (receive motor side) (Fig.25).

- When installing the receive motor on the receive motor holding bracket, fasten the two ground cables together with the receive motor cable seated on the left side (power unit side) (Fig.25).
- When fastening the receive motor holding bracket on the frame with the screw, make sure that the two positioning studs are engaged with the holes in the receive motor holding bracket (Fig.25),
- When installing the release spring lever on the release lever and the receive motor holding bracket. the side of the release lever spring hook must be engaged to the release lever (Fig.25).

**(2) Release lever**

a. Remove the release lever spring (Fig.26).
b. Remove the two screws (B2) that hold the receive motor holding bracket (w/motor and gears) on the frame, then remove the receive motor holding bracket from the frame (Fig.26).
c. Tilt the release lever towards the power supply unit and remove it.

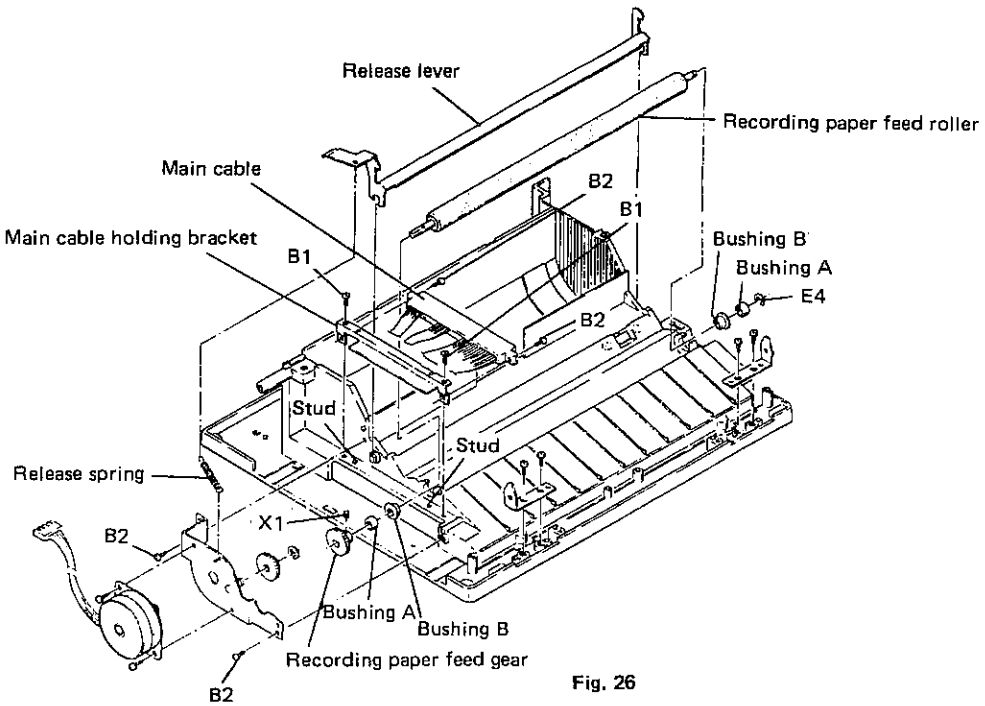



Fig. 26

**(3) Recording paper feed roller**

a. Remove the release lever spring (Fig.26).
b. Remove the receive motor holding bracket (w/motor and gears) from the frame, in reference to 13-(2)-b.
c. Loosen the one setscrew (X1) that holds the recording paper feed gear on the recording paper feed roller, than remove the recording paper feed gear, bushing A, and the bushing B from the recording paper feed roller (Fig.26).
d. Remove the E-ring (E4) that holds the right side recording paper feed roller on the frame, then remove the buhsings, A and B, from the recording paper feed roller (Fig.26).

**REASSEMBLY CAUTIONS:**

- The machined side of the recording paper feed roller must ve installed on the frame facing to left (motor side) (Fig,26).
- For the sequence of installing the bushing A, bushing B, and the recording paper feed gear, see Fig,26.

**(4) Main cable**

a. Remove the release lever spring,
b. Remove the receive motor holding bracket (w. /motor and gears) from the frame, in reference to 13-(1)-c.
c. Remove the recording paper feed gear from the recording paper feed roller, in reference to 13-(3-1).
d. Unfasten the five main cable connectors.
e. Remove the two screws (B2) that hold the main cable holding bracket (w/main cable) from the frame, then remove the main cable holding bracket from the frame (Fig..26).
f. Remove the two screws (B1) that hold the main cable onthe main cable holding bracket, the remove the cable from the main cable holding bracket (Fig.26).

**REASSEMBLY CAUTIONS:**

- When installing the main cable on the main cable holding bracket, pay attention nto to install it upside down. See Fig.26 for the installing directio.
- Connect the proper side of the two motor cables of the main cable. The black side of the motor cable connector must be connected with the receive motor.
- When installing the main cable holding bracket (w/main cable) on the frame, make sure that the main cable positioning stud is engaged with the hole in the frame (Fig.26).

**(5) Frame angles, left and right**

a. Remove the two screws (B1) that hold the subframe on the frame angle, then remove the subframe from the frame angle (Fig,24).
b. Remove the two screws (B2) that hold the exit guide on the frame, then remove the exit guide from the frame (Fig.27).
c. Remove the two screws (B2) that hold the frame angles, then remove the frame angles from the frame (Fig.27).

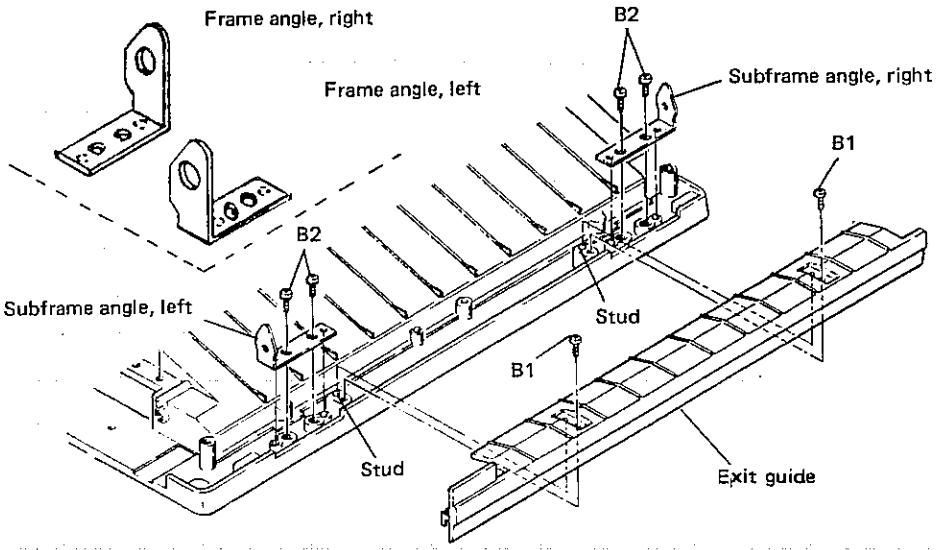



Fig. 27

**REASSEMBLY CAUTION:**

- When installing the frame angles on the frame, pay attention to the installing direction of the frame angles. The left side angle differs from the right side angle in its shape. See Fig.27.
- When installing the frame angles and the exit guide on the frame, make sure that the positioning stud is engaged with the hole in the frame angles and the exit guide (Fig.27).

**(6) Recording paper sheet and frame sheet replacement**

a. Wipe the area clean on which the recording paper sheet and the frame sheet are to be bonded (Fig.28).
b. The recording paper sheet must begin to bond from the roller side (front side) (Fig,28).
c. After bonding of the frame sheet, make sure that it is not in contact with the roller (Fig,28).

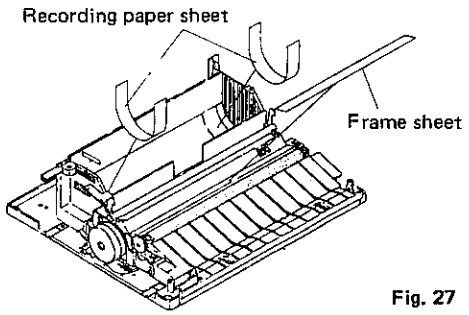



Fig. 27

## 14. Wiring route

**(1) Near the transmit and receive motors**

* This section deals with wiring treatment that was not discussed in section 1 to 13. Wires must be routed and installed properly to assure given performance of the products,

a. Wiring treatment at the area A in Fig.28

- Pay attention to the following when holding the head PS cable and ground wire with wiring tie.
  (1) Make sure that the cable protect sheet has been bonded on the transmit motor holding bracket (Fig.29).
  (2) For the head PS cable and the ground wire, the ground wire must be inside and the head PS cable outside, long the transmit motor holding bracket (Fig.29).
  (3) The head PS cable and the ground wire must be routed under the stud of the subframe and must be held with the wiring tie. The head of the wiring tie must face up (Fig.29).

**CONFIRMATION AFTER WIRING SETUP**

- After installing the cabinet, open and close the subframe to check that the head PS cable and the ground wire are not in contact with the edge of the cabinet.

b. Wiring treatment at the area B in Fig.28

- Except for 0.79" (20mm) of the LCD cable ends, the entire cable must be taped for protection.
- The LCD cable must be tied with wiring tie without looseness at the frame side connector and the open/close spring area (Fig.28).
- Install the LCD cable along the subframe between the operational unit and the open/close spring.
- When tieing the LCD cable, the wiring tie must not be higher than the stud. Also, the head of the wiring tie must face down (Fig. 29).

c. Wiring at the area C in Fig.28

- Note Fig. 28. The LCD cable must be held with the crimp terminal of the ground wire.

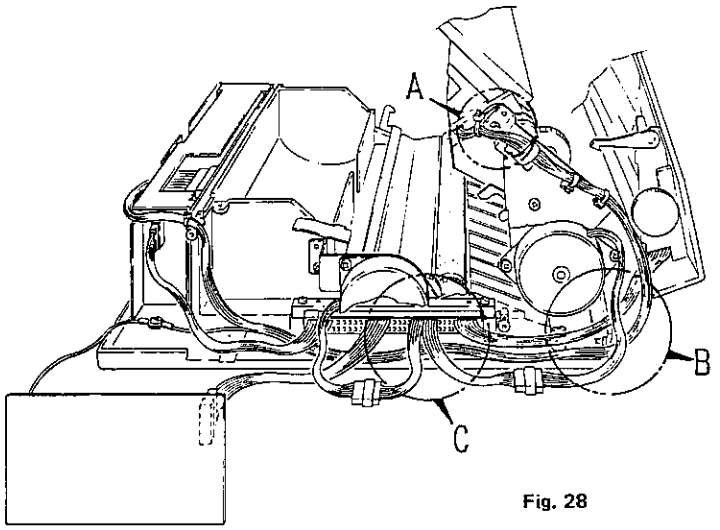



Fig. 28

**(2) Subframe**

a. Wiring at the area A in Fig. 30.

- Make sure that the head signal cable does not extend out of the rib (Fig. 30).
- When tieing the head signal cable and the document sensor cable with the wiring tie, reserve some allowance so that the head cable may be routed along the subframe wall.

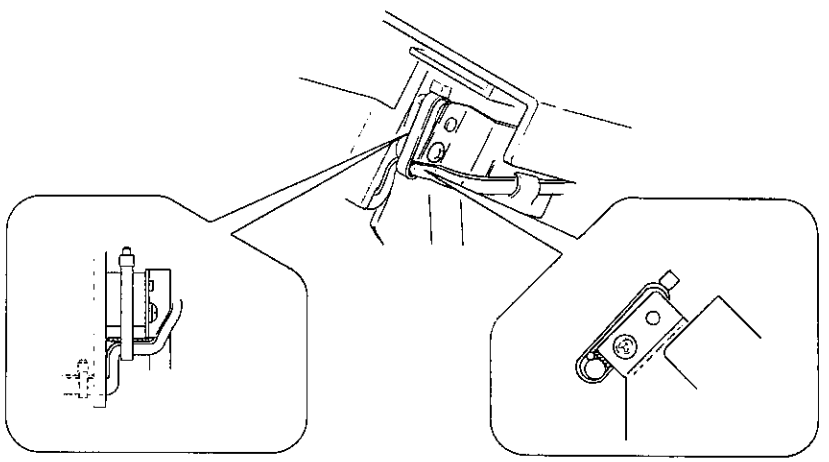


Fig. 29

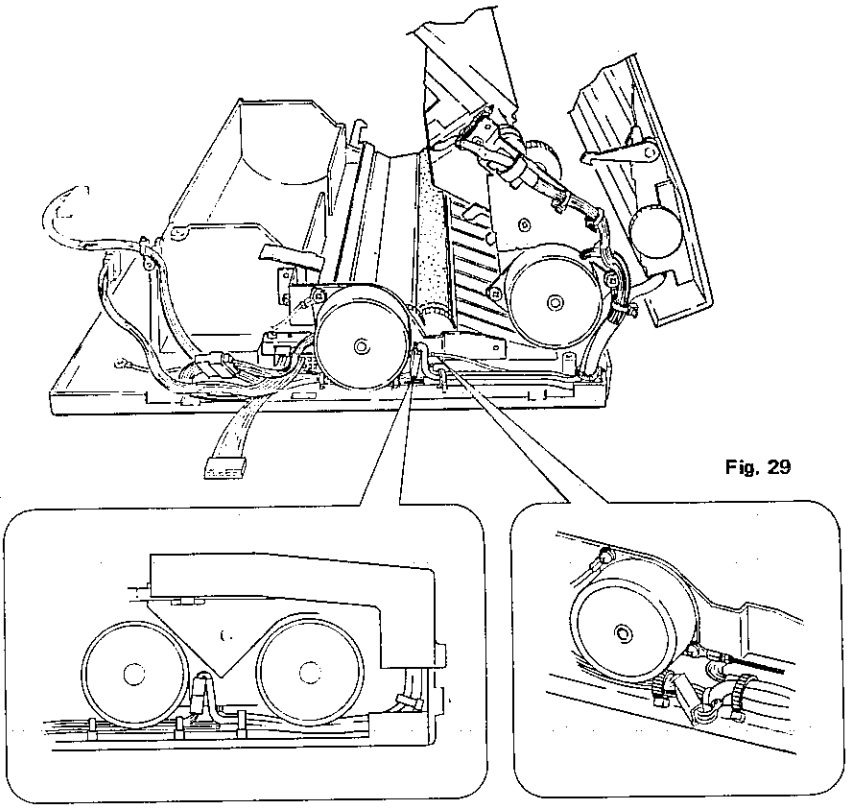


Fig. 29

**(3) Transmit motor**

a. To protect the transmit motor cable, tape 4.13" (105mm) from the connector side. Lay tape over tape using the ¼ width tape.

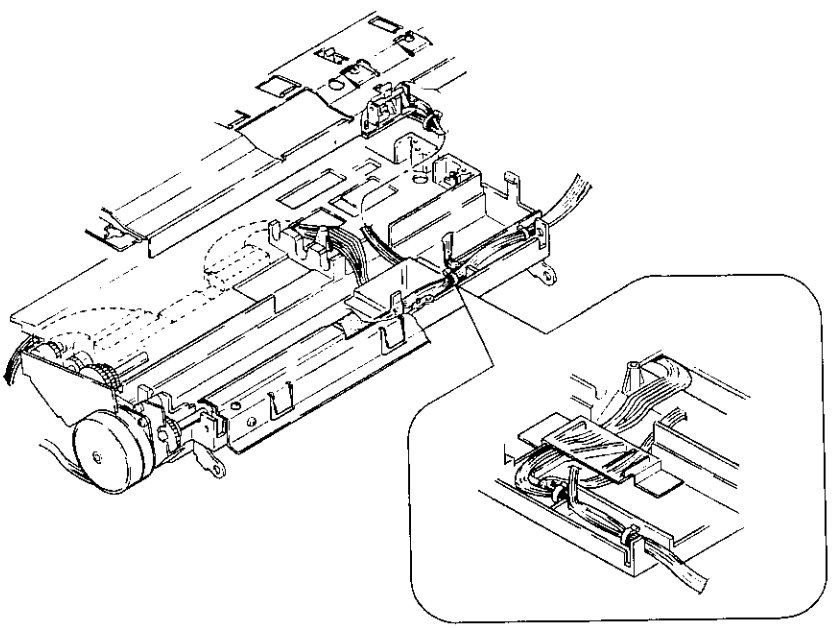
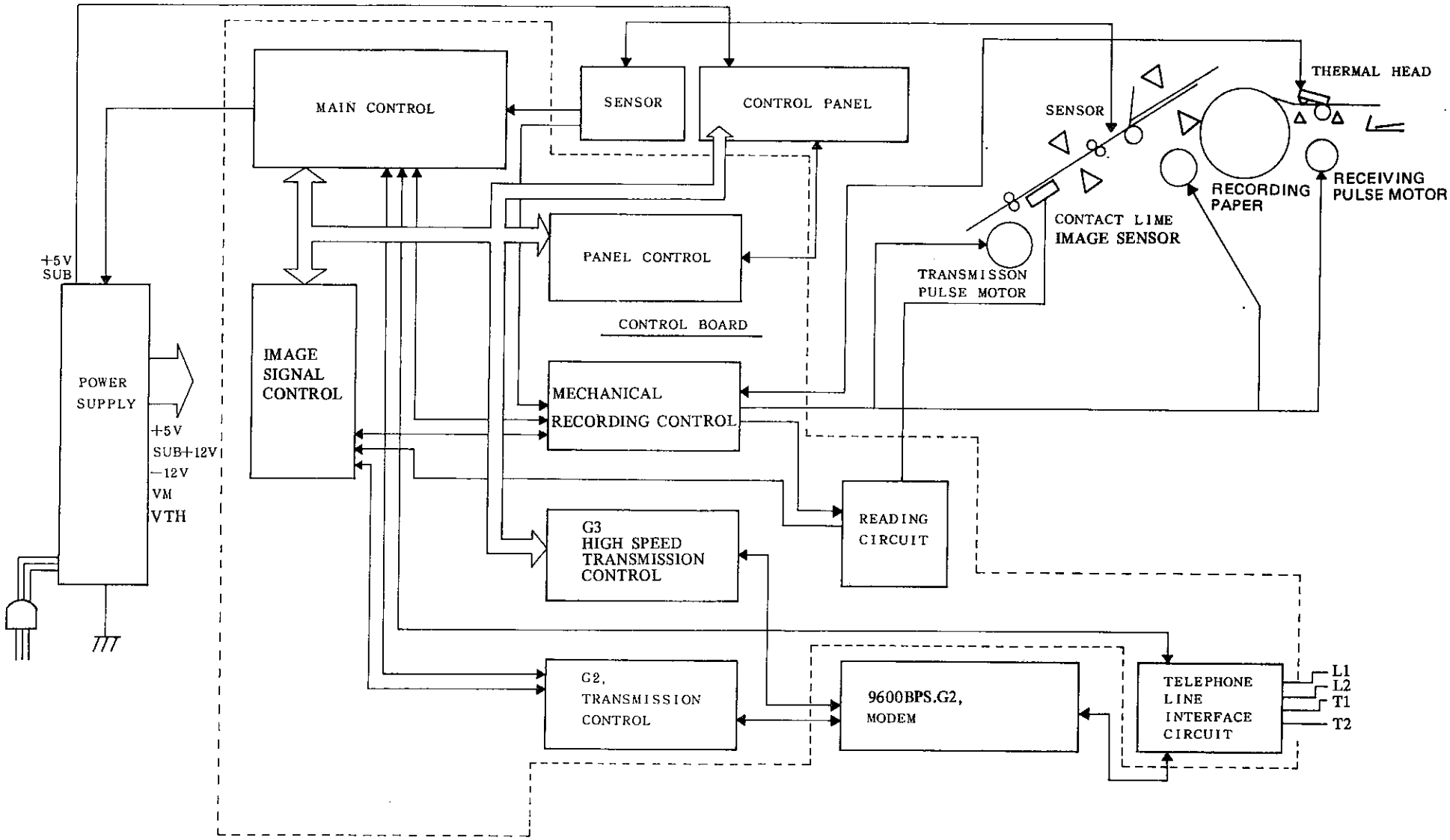


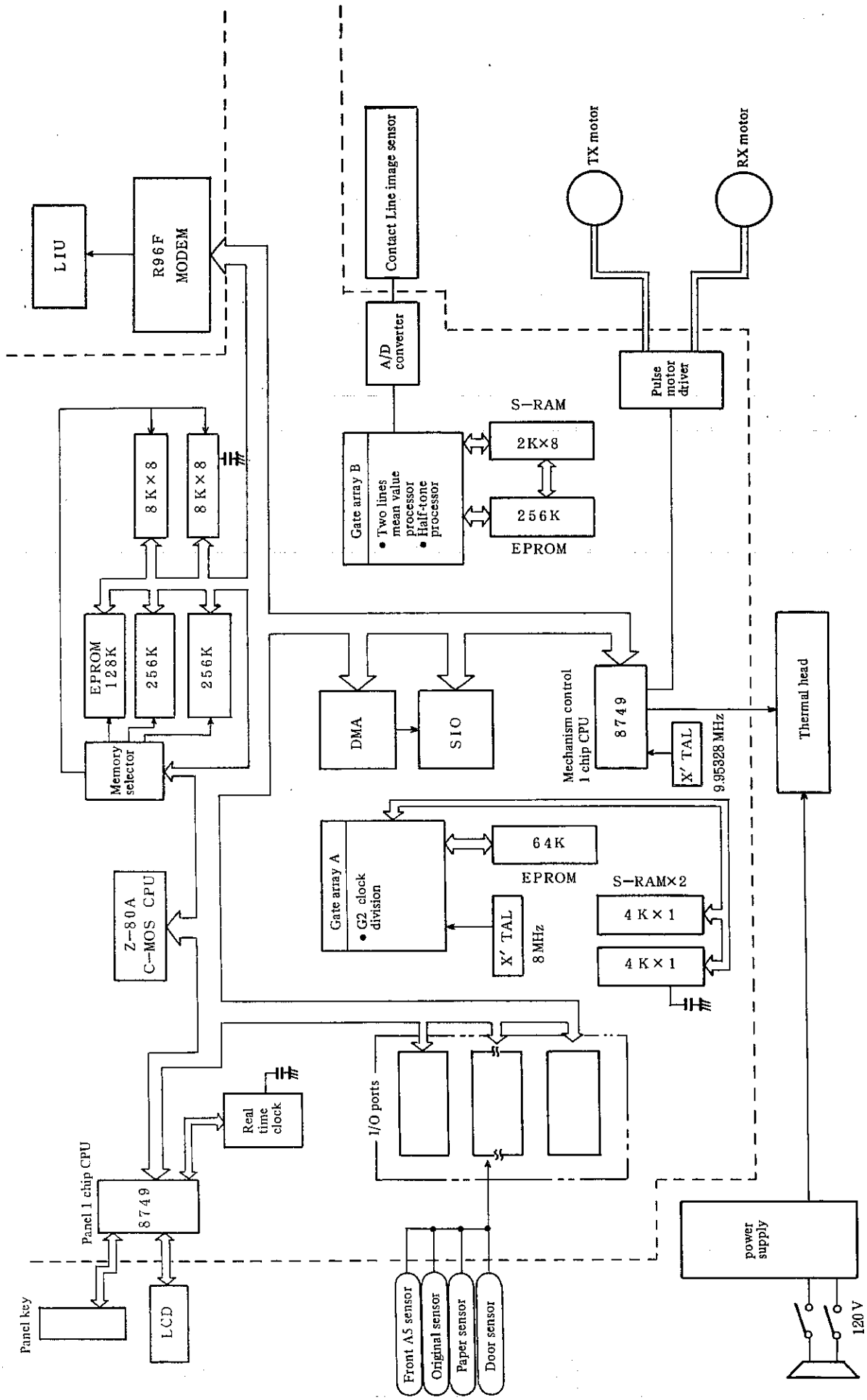
Fig. 30

# Chapter 4 Diagram

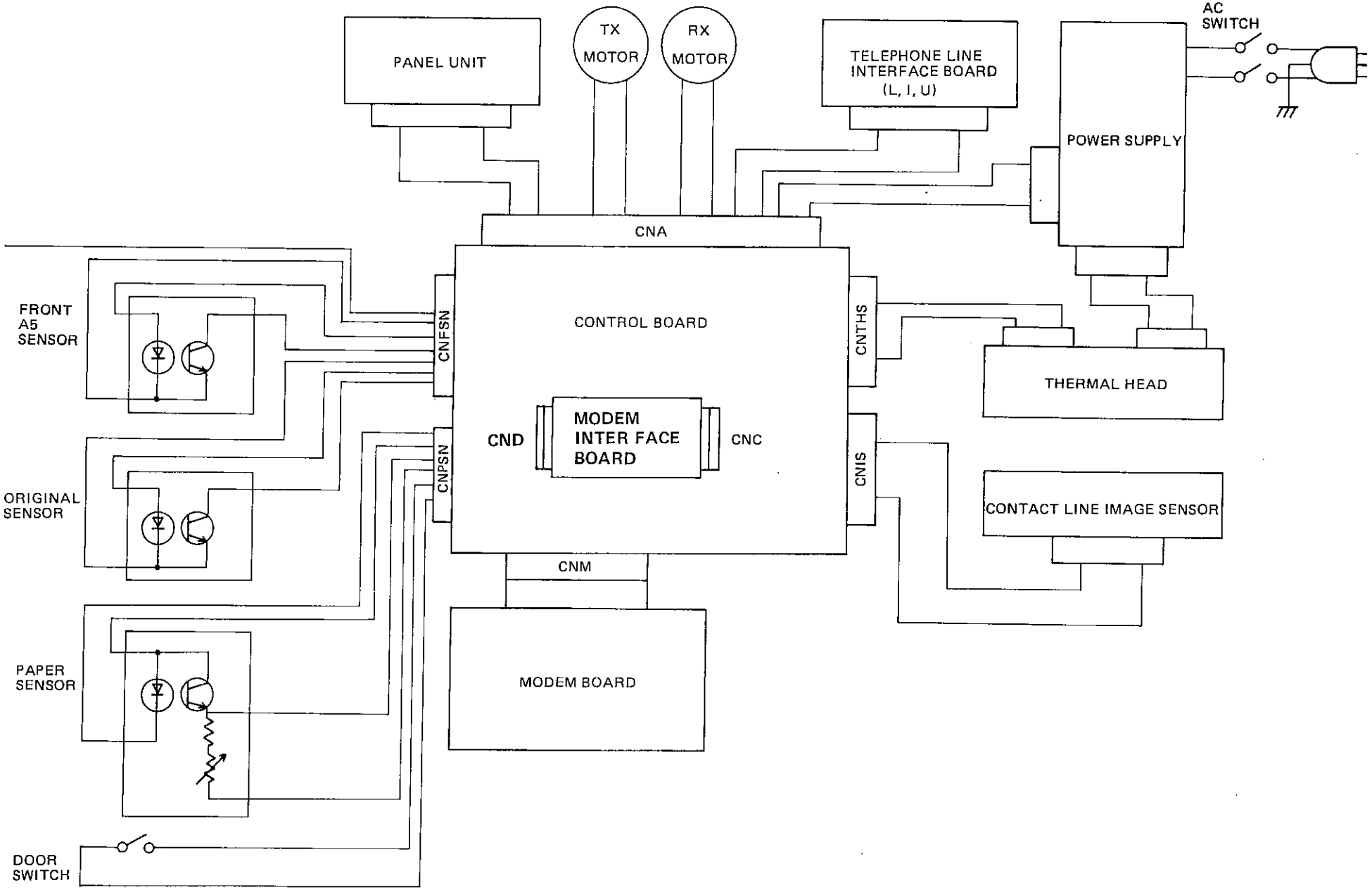
## [1] DIAGRAM



## [2] CIRCUIT DISCRIPTION DIAGRAM



## [3] WRING DIAGRAM



# [4] CONECTOR SIGNAL NAME

(CONTROL BOARD)

| CNA | | ME03-96P-M4LT1-A1 | |
|---|---|---|---|
| LD7 | 1 | 2 | LD6 |
| LD5 | 3 | 4 | LD4 |
| LD3 | 5 | 6 | LD2 |
| LD1 | 7 | 8 | LD0 |
| E | 9 | 10 | R/W |
| RS | 11 | 12 | V0 |
| SUB +5V | 13 | 14 | GND |
| $\overline{SEN1}$ | 15 | 16 | $\overline{SEN2}$ |
| $\overline{SEN3}$ | 17 | 18 | $\overline{SEN4}$ |
| N.U. | 19 | 20 | N.U. |
| N.U. | 21 | 22 | N.U. |
| N.U. | 23 | 24 | N.U. |
| N.U. | 25 | 26 | N.U. |
| N.U. | 27 | 28 | N.U. |
| N.U. | 29 | 30 | N.U. |
| $\overline{TPBD}$ | 31 | 32 | $\overline{TPAD}$ |
| TPBD | 33 | 34 | TPAD |
| VM | 35 | 36 | VM |
| $\overline{RPBD}$ | 37 | 38 | $\overline{RPAD}$ |
| RPBD | 39 | 40 | RPAD |
| VM | 41 | 42 | VM |
| N.U. | 43 | 44 | N.U. |
| N.U. | 45 | 46 | N.U. |
| N.U. | 47 | 48 | N.U. |
| N.U. | 49 | 50 | N.U. |
| SUB +12V | 51 | 52 | SUB -12V |
| GND | 53 | 54 | CML |
| L1 | 55 | 56 | LZ |
| ARRY | 57 | 58 | DSCU1 |
| $\overline{C1}$ | 59 | 60 | A |
| AT8 | 61 | 62 | AT7 |
| AT6 | 63 | 64 | 5V |
| AT5 | 65 | 66 | AT4 |
| AT3 | 67 | 68 | AT2 |
| AT1 | 69 | 70 | N.U. |
| N.U. | 71 | 72 | N.U. |
| N.U. | 73 | 74 | N.U. |
| N.U. | 75 | 76 | N.U. |
| N.U. | 77 | 78 | N.U. |
| N.U. | 79 | 80 | N.U. |
| VM | 81 | 82 | VM |
| MG | 83 | 84 | MG |
| DG | 85 | 86 | DG |
| +5V | 87 | 88 | +5V |
| AG | 89 | 90 | SUB +12V |
| BUS -12V | 91 | 92 | +10V |
| SUB +5V | 93 | 94 | $\overline{PON}$ |
| $\overline{CTH24V}$ | 95 | 96 | $\overline{LDON}$ |

| CNM | | HIF-3FB-40PA-2.54DS | |
|---|---|---|---|
| IORDM | 1 | 2 | $\overline{IOWRM}$ |
| +5V | 3 | 4 | +5V |
| D6 | 5 | 6 | $\overline{CSO}$ |
| D7 | 7 | 8 | A2 |
| D5 | 9 | 10 | A0 |
| $\overline{EYECLK}$ | 11 | 12 | EYESYNC |
| DCLM | 13 | 14 | GND |
| D3 | 15 | 16 | $\overline{RLSD}$ |
| $\overline{CTS}$ | 17 | 18 | $\overline{CSI}$ |
| $\overline{RTS}$ | 19 | 20 | TXD |
| RXD | 21 | 22 | XCLK |
| D1 | 23 | 24 | EYEX |
| EYEY | 25 | 26 | +12V |
| A1 | 27 | 28 | D2 |
| D0 | 29 | 30 | A3 |
| D4 | 31 | 32 | |
| CABS1 | 33 | 34 | CABS2 |
| AUXIN | 35 | 36 | $\overline{POR}$ |
| SUB -12V | 37 | 38 | TXOUT |
| GND | 39 | 40 | RXIN |

| CNC | |
|---|---|
| 1 | GND |
| 2 | N.U. |
| 3 | N.U. |
| 4 | N.U. |
| 5 | N.U. |
| 6 | SUB+12V |
| 7 | SUB-12V |
| 8 | +5V |
| 9 | GND |
| 10 | RXIN |
| 11 | TXOUT |
| 12 | PJSGT |

| CND | |
|---|---|
| 1 | N.U. |
| 2 | A |
| 3 | AT8 |
| 4 | AT6 |
| 5 | AT7 |
| 6 | AT5 |
| 7 | AT4 |
| 8 | AT3 |
| 9 | AT2 |
| 10 | AT1 |
| 11 | L1 |
| 12 | LZ |

| CNIS | | PS-12PLB-D4T1-FL1 | |
|---|---|---|---|
| +10V | 1 | 2 | GND |
| $\overline{DTS}$ | 3 | 4 | CL |
| $\overline{SP}$ | 5 | 6 | GND |
| SUB+12V | 7 | 8 | +5V |
| SUB-12V | 9 | 10 | VID |
| N.C. | 11 | 12 | N.C. |

| CNTHS | | LX-26P-DT1-P1 | |
|---|---|---|---|
| +5V | 1 | 2 | B.E.D |
| DATA | 3 | 4 | GND |
| $\overline{STRB1}$ | 5 | 6 | GND |
| $\overline{STRB2}$ | 7 | 8 | N.C. |
| $\overline{STRB3}$ | 9 | 10 | N.C. |
| $\overline{STRB4}$ | 11 | 12 | TH1 |
| $\overline{STRB5}$ | 13 | 14 | TH2 |
| $\overline{STRB6}$ | 15 | 16 | N.C. |
| $\overline{STRB7}$ | 17 | 18 | N.C. |
| $\overline{STRB8}$ | 19 | 20 | GND |
| $\overline{LATCH}$ | 21 | 22 | GND |
| PCLOCK | 23 | 24 | GND |
| N.C. | 25 | 26 | GND |

| CNFSN | | 1L-S-9P-52T2-EF |
|---|---|---|
| 1 | ORGK | |
| 2 | ORGA | |
| 3 | SORG | |
| 4 | FRA4K | |
| 5 | FRA4A | |
| 6 | SFRA4 | |
| 7 | FRA5K | |
| 8 | FRA5A | |
| 9 | SFRA5 | |

| CNPSN | | 1L-S-6P-52T2-EF |
|---|---|---|
| 1 | PDORG | |
| 2 | PDORS | |
| 3 | SPAP | |
| 4 | GPAP | |
| 5 | PAPA | |
| 6 | PAPK | |

CAD-S1839

# Chapter 5 Circuit discription

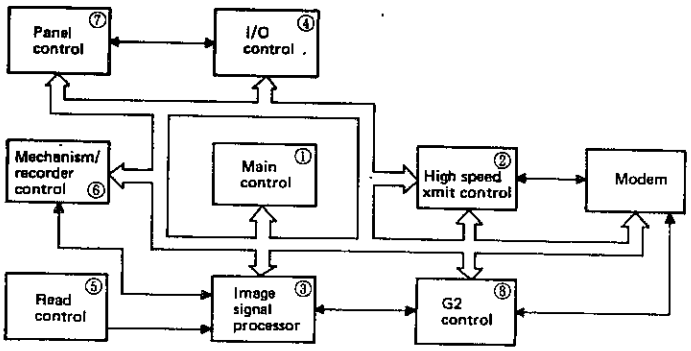
## [1] CONTROL PWB

### 1. General

The control board consists of the following eight functional blocks:

1. Main control block
2. High speed transmission control block
3. Image signal processing block
4. I/O control block
5. Read data processing block
6. Mechanical/recording section control block
7. Panel control block
8. G2 transmission control block

### 2. Block diagram




### 3. Description of each block

### 3-1. Main control block

The main control block consists of a Z-80A microprocessor, program ROM, and RAM.

The following describes the transmission control sequence:

During standby mode, power is on to the panel control block. When a key operation is sensed, the panel control issues the PON signal to turn the main power on. LED and key data are transferred between the panel control and the main CPU. When it senses a START key operation, the I/O control delivers a CML signal to the LIU to connect the subscriber line to the machine by the actuation of the CML relay.

Next, the high speed transmitter is activated to control the procedure signal via modems and let the document be transferred to the reading position.

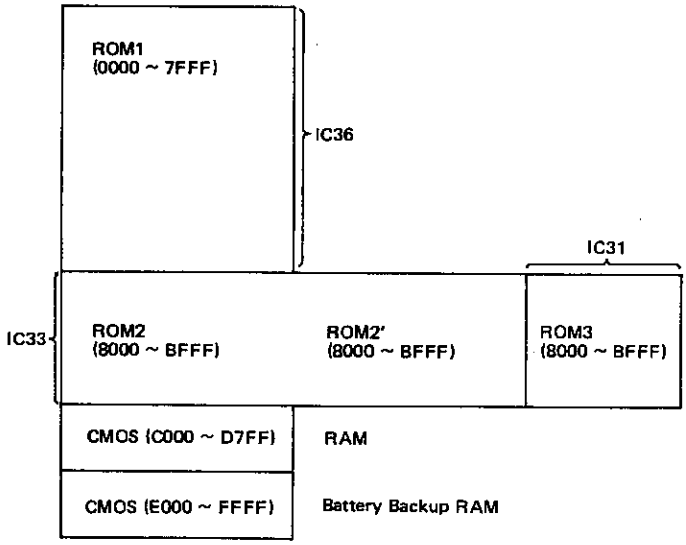
When the document reaches the reading position, the control block activates the read data processing block, which converts the contact sensor signal into binary data and transfers them to the line memory. The binary image data is then coded through the line memory control block and is stored in the code buffer within the RAM. AS the image information is coded, it is converted into serial data by the high speed transfer control block and sent on the line via the modem. The document is thus sequentially scanned during transmission.

The following describes the reception control sequence:

There are two modes of manual and automatic for the initiation of the receive mode. In either mode, data transfer takes place in the panel control block, and the procedure signal is controlled upon going into the receive mode. When it goes into the phase C (image reception), data in the high speed transmitter is temporarily stored in the receive buffer (RAM). The received code in the buffer activates the line control block, which decodes the encoded data in the line memory. As data decoding process goes on, the mechanical/recorder control block records the line memory data onto the recording paper, line by line, until the entire document is reproduced.

As a 80KB area is provided in the control ROM, the address 8000 thru BFFF are used alternately.

The figure below shows the memory map.




### 3-2. High speed transmission control block

The modem interface circuit consists of the transmission control microchip (SIO) used to control the 300 bps control signal and G3 signal. For modem mode setup, tonal signal send/receive, and receive signal verification, the microprocessor directly controls the modem through the data bus without intervention of the interface.

Though the SIO has two independent full-duplex channels, only one of channels (channel A) is used. It operates in the SDLC mode during transfer of 300 bps control signal and in the external sync mode during transfer of G3 image signal. SIO operations are all program controlled and data transfer with the microprocessor is conducted by means of an interrupt.

The following describes send operations:

Before sending the 300 bps control signal, the SIO channels are reset, and modes are set for SDLC mode, 8-bit data size, flag for synchronization, and CRC enable. The RTS signal is then sent to the modem and an interrupt enable and send enable commands are given to the SIO. At this time, the flag is sent through the data output terminal. When the first character is written into the SIO, interrupts are subsequently requested each time the SIO data buffer becomes empty. When all the data has been sent by the interrupt service routine, the send enable and RTS signal are cleared to terminate the send operation. During transmission of G3 image signal, the same procedure is observed after setting it in the external sync mode and 8-bit data size. Until the first character has been written into the SIO, the data output terminal retains a MARK state.

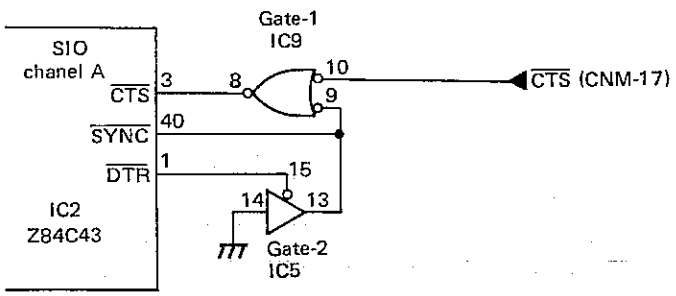
The following discusses receive operations.

For receiving of the 300 bps control signal, the SIO channels are reset first and the SDLC check address is set into channel along with channel modes. Then, an interrupt enable and receive enable commands are given to the SIO. The address field is checked after the FLAG pattern is detected. If found, the SIO reads the received data, and issues an interrupt when it receives 8 bits of data. After this, an interrupt is requested each time 8 bits of data are received to read data from the SIO through the microprocessor interrupt routine. When the SIO receives the frame end flag, receive enable is cleared to terminate the receive operation.

Transmission control microchip Z84C43 Z-80A SIO/1 (IC2)

| No. Signal kind | Pin No. | Signal name | I/O | | |
|---|---|---|---|---|---|
| 1 Data bus | 27 | D0 | I/O | LSB | |
| | 29 | D1 | I/O | | |
| | 26 | D2 | I/O | | |
| | 30 | D3 | I/O | Command and data transfer with CPU | |
| | 25 | D4 | I/O | | |
| | 31 | D5 | I/O | | |
| | 24 | D6 | I/O | | |
| | 32 | D7 | I/O | MSB | |
| 2 SIO control | 22 | $\overline{CE}$ | I | Chip enable, active low | |
| | 6 | $\overline{RESET}$ | I | Reset, active low | |
| | 36 | $\overline{M1}$ | I | Machine cycle 1, active low | |
| | 23 | $\overline{IORQ}$ | I | I/O request, active low | |
| | 19 | $\overline{RD}$ | I | Read cycle, active low | |
| | 21 | B/$\overline{A}$ | I | Channel assign (channel A = low) | |
| | 20 | C/$\overline{D}$ | I | Command /data assign (control command = high) | |
| 3 Interrupt control | 33 | $\overline{INT}$ | O | Interrupt request, active high | |
| | 34 | IEI | I | Interrupt enable input, active high | |
| | 35 | IEO | O | Interrupt enable output, active high | |
| 4 Channel A | 41 | RXD | I | Receive data, active high | |
| | 42 | $\overline{RXC}$ | I | Receive clock (RXD sampled at the rising edge) | |
| | 44 | TXD | O | Send data, active high | |
| | 43 | $\overline{TXC}$ | I | Send clock (TXD changed at the rising edge) | |
| | 40 | $\overline{SYNC}$ | I/O | External sync, input; internal sync, output (active low) | |
| | 38 | W/$\overline{RDY}$ | O | Wait/ready | |
| | 2 | $\overline{TRS}$ | O | Ready to send, active low | Modem control |
| | 3 | $\overline{CTS}$ | I | Clear to send, active low | Modem control |
| | 1 | $\overline{DTR}$ | O | Data terminal ready, active low | Modem control |
| | 4 | $\overline{DCD}$ | I | Data carrier detect, active low | Modem control |

During reception of the G3 image signal, interrupt enable and receive enable commands are given to the SIO after setting the external sync mode and 8-bit data size. As interrupt occurs at reception of every 8-bit data, data is read from the SIO by the microprocessor interrupt routine. When the RTC signal is received, receive enable is cleared to terminate the receiving operation. During reception in the SDLC internal sync mode of 300 bps signal, DTR is forced high to make the gate 2 output (pin 13, IC5) high impedance.
When synchronization is attained within the SIO, the sync signal is issued from the SYNC terminal to be supplied to CTC via the gate 1 (pin 8, IC9) to monitor the synchronization. During reception in the external sync mode of G3 image signal, the SYNC terminal becomes an input and no sync signal is supplied. In this event, DTR is made low to keep the gate 2 output low so as to force synchronization.




## 3-3. Image signal control block

For the FO-200, the image signals are fully input to the buffer within the RAM and compressed or decompresseded softwarewise.
To input the scanned image signal into the RAM buffer, the scanned binary signal RVID is DMA transferred to the image buffer within the RAM through flipflop, gate, and RXDB of the SIO.
The recording image signal is DMA transferred to the SIO from the image buffer within the RAM, and the recording signal PVID is sent out from TXDB of the SIO.

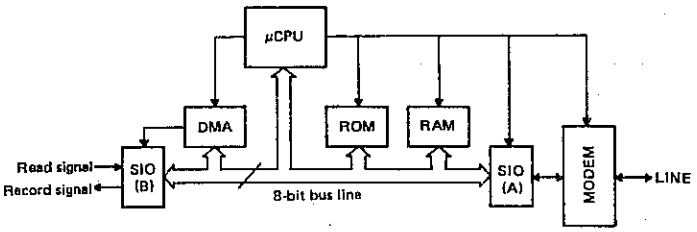



**Image signal control block diagram**

## 3-4. I/O control block

The I/O control block interfaces sensor inputs, dip switch inputs, and mechanical/recorder block, and supplies clock to the read data processor.

**IC24 (8255)**

| Port | Signal name | I/O | Description |
|---|---|---|---|
| PA7 | MD | I | Receive data |
| PA6 | SYNCO | I | G2 mode control signal |
| PA5 | DSW1 | I | SW2-1P input |
| PA4 | DSW3 | I | SW2-3P input |
| PA3 | DSW4 | I | SW2-4P input |
| PA2 | $\overline{HS1}$ | I | Facsimile hook SW signal |
| PA1 | $\overline{HS2}$ | I | Facsimile hook SW signal |
| PA0 | $\overline{STOPK}$ | I | Stop key input signal |
| PB7 | MHPC | O | G2 mode control signal |
| PB6 | MHPS | O | G2 mode control signal |
| PB5 | $\overline{SYCLP}$ | O | G2 mode control signal |
| PB4 | GATE | O | Read signal select output |
| PB3 | MS4 | O | G2 mode control signal |
| PB2 | MS3 | O | G2 mode control signal |
| PB1 | MS2 | O | G2 mode control signal |
| PB0 | MS1 | O | G2 mode control signal |
| PC7 | EQCN | O | Equalizer ON/OFF signal |
| PC6 | CABS2 | O | Modem cable equalizer setup |
| PC5 | CGCLK | O | SIO clock select signal |
| PC4 | CABS1 | O | Modem cable equalizer setup |
| PC3 | G2GT | O | G2 gate signal |
| PC2 | — | O | — |
| PC1 | BS1 | O | ROM bank select signal |
| PC0 | BS0 | O | ROM bank select signal |

IC26 (8255)

| Port | Signal name | I/O | Description |
|---|---|---|---|
| PA7 | MODE3 | O | Mechanical control CPU command signal |
| PA6 | MODE2 | O | Mechanical control CPU command signal |
| PA5 | MODE1 | O | Mechanical control CPU command signal |
| PA4 | SKIP | O | Mechanical control CPU command signal |
| PA3 | $\overline{\text{MINT}}$ | O | Mechanical control CPU command signal |
| PA2 | ORE | O | OR process signal |
| PA1 | $\overline{\text{LDON}}$ | O | LED activating signal |
| PA0 | – | O | – |
| PB7 | – | O | – |
| PB6 | – | O | – |
| PB5 | G/$\overline{\text{DFM}}$ | O | G2 mode select signal |
| PB4 | $\overline{\text{CML}}$ | O | CML relay drive signal |
| PB3 | $\overline{\text{CTH24V}}$ | O | Thermal power on signal |
| PB2 | SL2 | O | Read signal slice level select signal |
| PB1 | SL1 | O | Read signal slice level select signal |
| PB0 | SL0 | O | Read signal slice level select signal |
| PC7 | ACK | I | Mechanical control CPU acknowledge response |
| PC6 | NAK | I | Mechanical control CPU negation response |
| PC5 | TM0 | I | Timer-1 output |
| PC4 | TM1 | I | Timer-2 output |
| PC3 | TM2 | I | Timer-3 output |
| PC2 | $\overline{\text{CI}}$ | I | Called signal |
| PC1 | – | I | – |
| PC0 | EYEY | I | Not used |

IC22 (8255)

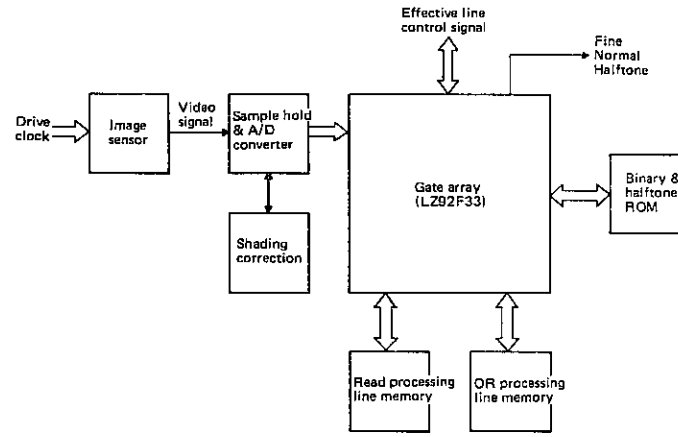
| Port | Signal name | I/O | Description |
|---|---|---|---|
| PA7 | HFTN | I | Halftone/binary select |
| PA6 | – | I | – |
| PA5 | SW6 | I | Halftone slice level select |
| PA4 | SW5 | I | Halftone slice level select |
| PA3 | SW4 | I | Halftone slice level select |
| PA2 | SW3 | I | Binary slice level select |
| PA1 | SW2 | I | Binary slice level select |
| PA0 | SW1 | I | Binary slice level select |
| PB7 | – | I | – |
| PB6 | EYESYNC | I | (Not used) |
| PB5 | $\overline{\text{PDORSNS}}$ | I | Door sense signal |
| PB4 | – | I | |
| PB3 | $\overline{\text{ORGSNS}}$ | I | Front sensor signal |
| PB2 | – | I | – |
| PB1 | $\overline{\text{FRTA5SNS}}$ | I | Document sense signal (A5) |
| PB0 | $\overline{\text{PAPSNS}}$ | I | Recording paper sense signal |
| PC7 | $\overline{\text{PISGT}}$ | I | PIS detect signal |
| PC6 | PRDY | I | Receive/copy line start |
| PC5 | $\overline{\text{OBF}}$ | I | Panel control block interface signal |
| PC4 | IBF | I | Panel control block interface signal |
| PC3 | COM/DT | O | Panel control block interface signal |
| PC2 | – | O | – |
| PC1 | $\overline{\text{ROST}}$ | O | Read-out start |
| PC0 | $\overline{\text{RIST}}$ | O | Read-in start |

## 3-5. Read data processing block

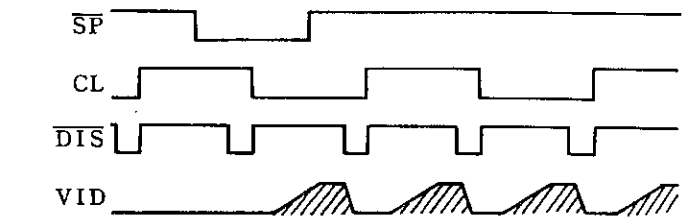
### 1. Outline

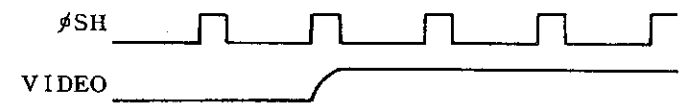
Shown below is the circuit configuration of the read data processing block. The contact sensor is used in the optical system. The analog to digital converted video signal is supplied to the gate array to produce binary data according to the given mode.

### 2. Block diagram and timing




Block diagram




Timing chart

### 3. Block descriptions

#### 1) Contact image sensor

The image sensor and the optical system composed of mirrors and lens, which are usually costituted in separate blocks, are built in the same block for this model. The flourescent lamp used for light source is replaced by a modular type LED array. With the following clocks and power supplies, the video signal amplified to an appropriate level.

**Contact image sensor connector pin description**

| Pin No. | Signal name | Function |
|---|---|---|
| 1 | 10V | LED supply |
| 2 | GND | – |
| 3 | $\overline{\text{DIS}}$ | Discharge clock |
| 4 | CL | Drive clock |
| 5 | $\overline{\text{SP}}$ | Start pulse |
| 6 | GND | – |
| 7 | +12V | – |
| 8 | −5V | – |
| 9 | −12V | – |
| 10 | VID | Video signal |
| 11 | – | Not used |
| 12 | – | Not used |

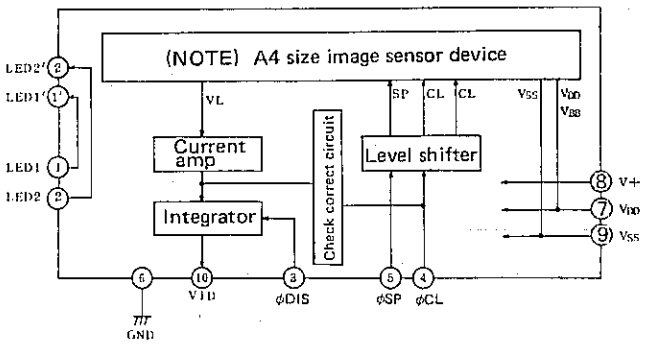
*Pin number is identical on both sensor and controller sides.

## Features

- The image sensor used is a close contact type linear image sensor whose size is the same as the document.
- Has an internal scan circuit in which contained a-Si pin photodiode array and the poly-Si FTF scan circuit integrated on the same board.
- Effective number of pixels: 1730 bits (8 bits/mm)
- Incorporates the external peripheral circuit (input buffer, sense amp).

Modular block (Contact image sensor)

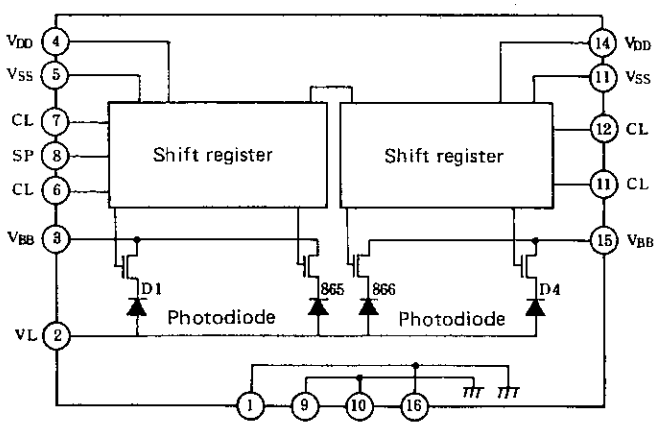
Modular block diagram



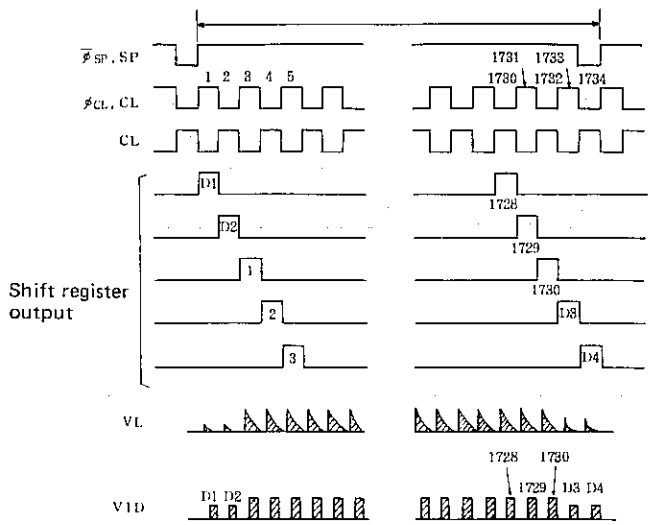

| Symbol | Description |
|---|---|
| VID | Image signal output line |
| $\overline{\phi DIS}$ ($\overline{DIS}$) | Discharge pulse bar line |
| $\overline{\phi SP}$ ($\overline{SP}$) | Start pulse bar line |
| φCL (CL) | Clock line |
| V + (+5V) | Positive power supply |
| VDD (+12V) | Device positive power supply |
| VSS(−12V) | Device negative power supply |
| GND | Ground line |
| LED 1(10V) | LED power supply line |
| LED 2(GND) | LED power supply line |

Sensor device circuit

Sensor device circuit diagram




| Symbol | Description |
|---|---|
| VL | Image signal output |
| $\overline{SP}$ | Opposite phase start pulse |
| CL | Clock supply |
| VBB | Photodiode bias power supply |
| VSS | Negative power supply |
| VDD | Positive power supply |
| GND | Ground |




2) Shading correct circuit
From the data stored in IC51 (HM6147), IC11 (HD46304) produces a shading waveform.

3) Sample hold and A/D conversion circuits
The sample hold circuit consists of IC12 (TL084) and IC13 (UPD4066) which converts a pulse form video signal into the waveform sampled.
The A/D conversion circuit consists of the A/D converter of IC14 (HA19203MP) and its peripheral circuit which produces the shading corrected digital video signal.

4) Binary acceptance and halftone circuits
Around the gate array (IC7, LZ92F33) consists the read processing line memory (IC6, TMM2015AP), OR processing line memory (IC47, HM6147), and the binary acceptance and halftone data table ROM (IC3, 27128). By adding control signals to the gate array, the binary output is produced for fine/standard halftone reproduction.
See the list in the next page for description of gate array pins.

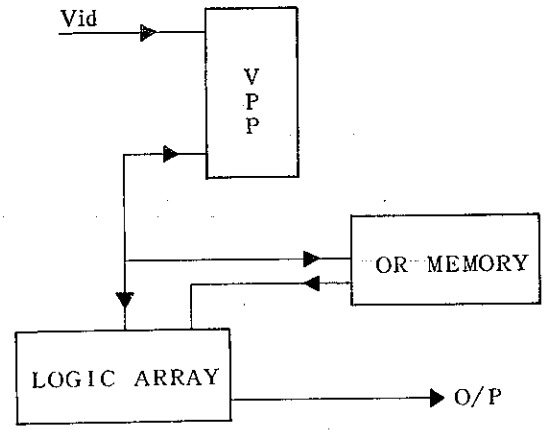
**LZ92F33 pin description (IC7)**

| No. | Signal name | I/O | Description |
|---|---|---|---|
| 1 | SP | I | Line sync signal input |
| 2 | RCP125 | I | Basic clock input |
| 3 | ADCK | O | A/D convert clock output |
| 4 | AD3 | I | A/D conversion data input |
| 5 | AD2 | I | A/D conversion data input |
| 6 | AD1 | I | A/D conversion data input |
| 7 | AD0 | I | A/D conversion data input |
| 8 | 3RD3 | I/O | RAM data (two lines before) |
| 9 | 3RD2 | I/O | RAM data (two lines before) |
| 10 | 3RD1 | I/O | RAM data (two lines before) |
| 11 | 3RD0 | I/O | RAM data (two lines before) |
| 12 | GND | – | |
| 13 | 2RD3 | I/O | RAM data (one line before) |
| 14 | 2RD2 | I/O | RAM data (one line before) |
| 15 | 2RD1 | I/O | RAM data (one line before) |
| 16 | 2RD0 | I/O | RAM data (one line before) |
| 17 | 1RD3 | I/O | RAM data (current line) |
| 18 | 1RD2 | I/O | RAM data (current line) |
| 19 | 1RD1 | I/O | RAM data (current line) |
| 20 | 1RD0 | I/O | RAM data (current line) |
| 21 | GND | – | |
| 22 | GATE | I | I/O control signal input |
| 23 | OE | O | I/O control signal output |
| 24 | $\overline{CS}$ | O | RAM chip select signal |
| 25 | $\overline{OE}$ | O | RAM output enable signal |
| 26 | $\overline{WE}$ | O | RAM write enable signal |
| 27 | TST1 | I | Test input, 1: test, 0: operation |
| 28 | TOR2 | I | Mean area line number select. 1: 2 lines, 0: 3 lines |
| 29 | PC01 | O | Test output, NU: operation |
| 30 | PC02 | O | Test output, NU: operation |
| 31 | RA11 | O | RAM address |
| 32 | RA10 | O | RAM address |
| 33 | RA9 | O | RAM address |
| 34 | RA8 | O | RAM address |
| 35 | RA7 | O | RAM address |
| 36 | RA6 | O | RAM address |
| 37 | RA5 | O | RAM address |
| 38 | RA4 | O | RAM address |
| 39 | RA3 | O | RAM address |
| 40 | GND | – | |
| 41 | RA2 | O | RAM address |
| 42 | RA1 | O | RAM address |
| 43 | RA0 | O | RAM address |
| 44 | S5 | O | Test output (NU: operation) |
| 45 | S4 | O | Test output (NU: operation) (Mean concentration low order bits) |
| 46 | S3 | O | Test output (NU: operation) (Mean concentration low order bits) |
| 47 | S2 | O | Test output (NU: operation) (Mean concentration low order bits) |
| 48 | S1 | O | Test output (NU: operation) (Mean concentration low order bits) |
| 49 | S0 | O | Test output (NU: operation) (Mean concentration low order bits) |
| 50 | CEN | O | Initial deduction prohibit signal during computation of mean concentration |
| 51 | ROA11 | O | ROM address (data) |
| 52 | ROA10 | O | ROM address (data) |
| 53 | ROA9 | O | ROM address (data) |
| 54 | ROA8 | O | ROM address (data) |
| 55 | ROA7 | O | ROM address (data) |
| 56 | ROA6 | O | ROM address (data) |
| 57 | ROA5 | O | ROM address (data) |
| 58 | ROA4 | O | ROM address (data) |
| 59 | ROA3 | O | ROM address (data) |
| 60 | ROA2 | O | ROM address (data) |
| 61 | ROA1 | O | ROM address (data) |
| 62 | ROA0 | O | ROM address (data) |
| 63 | GND | – | |
| 64 | OD7 | I | Binary signal (ROM output) |
| 65 | OD6 | I | Binary signal (ROM output) |
| 66 | OD5 | I | Binary signal (ROM output) |
| 67 | OD4 | I | Binary signal (ROM output) |
| 68 | OD3 | I | Binary signal (ROM output) |
| 69 | OD2 | I | Binary signal (ROM output) |
| 70 | OD1 | I | Binary signal (ROM output) |
| 71 | OD0 | I | Binary signal (ROM output) |
| 72 | BOUT | O | Binary signal (selected) |
| 73 | BORH | I | Normal and halftone selection 1: halftone, 0: normal |
| 74 | BCNT2 | I | Normal image quality selection |
| 75 | BCNT1 | I | Normal image quality selection |
| 76 | BCNT0 | I | Normal image quality selection |
| 77 | HCNT2 | I | Halftone image quality selection |
| 78 | HCNT1 | I | Halftone image quality selection |
| 79 | HCNT0 | I | Halftone image quality selection |
| 80 | ORE | I | Fine and normal selection 1: standard, 0: normal |
| 81 | DI2 | O | OR processing memory write data |
| 82 | DO2 | I | OR processing memory read data |
| 83 | WR2 | O | OR processing memory write enable signal |
| 84 | WRP | I | Binary output latch clock |
| 85 | RVID | O | Last binary output |
| 86 | RDGT | I | Binary output effective period assign signal (in one line) |
| 87 | RRDY | I | Effective line assign signal (from CPU) |
| 88 | SREST | I | SRRDY reset signal |
| 89 | VCC | – | |
| 90 | GND | – | |
| 91 | SRRDY | O | Effective binary output line assign signal |
| 92 | STVD | I | Video start signal |
| 93 | REDUL | I | Reduction control signal |
| 94 | LSTVD | O | Effective video start signal |
| 95 | HLCLR | I | Sub scan direction dither counter initial clear |
| 96 | SCCLK | I | Main scan direction dither counter clock input |
| 97 | LNSTA | O | Sun scan direction dither counter clock output |
| 98 | LNSTB | I | Sub scan direction dither counter clock input |
| 99 | LNST | I | Line start signal (VPP) |
| 100 | STIM | I | RRDY latch clock |

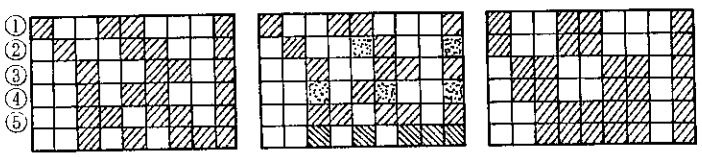
5) OR processing circuit

Binary converted data from the binary process circuit are transferred to the OR circuit where the image signal obtained in the fine mode (7.7 line/mm) is converted into 3.85 lines/mm of the standard mode. When we select the fine mode, the image signal go through this circuit. This circuit is used standard mode only. The following is the process of the circuit at standard mode.

In the FO-2500 standard mode transmission was achieved by simply "OR-ING" together two sequenctial scan lines and printing the result twice at the receiver. The "OR-ING" process results always in extra bits being added and this gives the end copy a chunky appearance. To overcome this, a new method of achieving standard mode is used.




1. Scan line 1 is fed via the VPP to the logic array. At the same time the contents of the OR memory are output also to the logic array and "ORRED" with scan line 1. As the contents of the OR memory at this stage are all zero's the effect of "OR-ING" is that line 1 remains unchanged. Line 1 is now transmitted to be printed twice at the receiver.
2. Scan line 2 is fed via the VPP to the "OR" memory.
3. Scan line 3 is fed to the logic array. At the same time, scan line 2 is output from the memory and is used to modify scan line 3, such that wherever line 2 has a black pixel coincident with line 3, that pixel in line 3 will be changed to white. The modified line 3 is then output to the OR Memory.
4. Scan line 4 is fed via the VPP to the logic array. At the same time, modified scan line 3 is output from the memory to the logic array and "ORRED" with line 4. The result is now transmitted to be printed twice at the receiver.
5. Scan line 5 is fed via the VPP to the memory.
6. Scan line 6 is fed via the VPP to the logic array. At the same time line 5 is output from the memory and used to modify line 6 as per step 3 and the process then repeats until the end of copy.




When sending the line of ③ to the line memory, it would not be simply ORed with the line of ②, the image signal of the line ② is varied by the line ① – NOT of line ① is ANDed with the line ②, as stated in the logic table – and first stored in the OR line memory (IC16). Then, the line ② thus changed is ORed with the image signal of the line ③ in IC6.

Where, 0 represents white and 1 black.

logic table

| ① | ② | $\overline{①}$ | $\overline{①}$ AND ② |
|---|---|---|---|
| 0 | 0 | 1 | 0 |
| 0 | 1 | 1 | 1 |
| 1 | 0 | 0 | 0 |
| 1 | 1 | 0 | 0 |

At receive side print two times of the line ③.

## 3-6. Mechanical/recorder control block

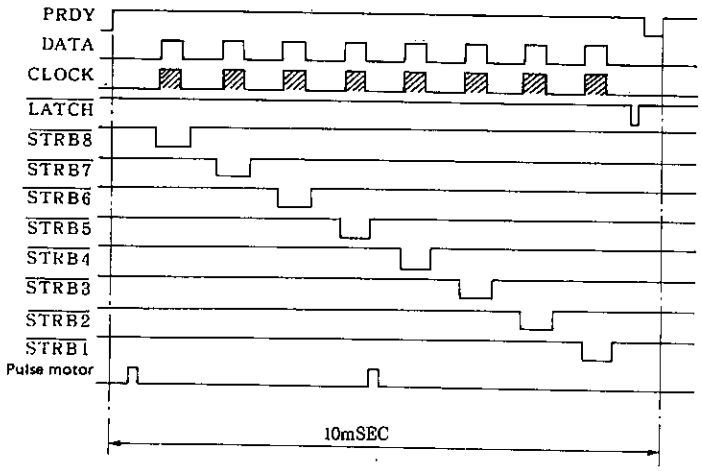
This block consists of a single-chip microprocessor and extended I/O ports. The microprocessor is a complete slave CPU to the main microprocessor on the main control board. It receives the Mode 1 through 3 signals and SKIP signal from the master CPU as command information and executes the command functions. When the execution of each command function is completed, the slave CPU returns an ACK to the master CPU. If the execution is incomplete or completed unsuccessfully, it return a NAK to the master CPU. For mechanical control, the slave CPU directly controls the pulse motor and clutch of the transmit and receive systems to control document insertion and transfer, recording paper feed, and paper cut. The 2-phase pulse motor is used for both the transmit and receive systems which are controlled through the bus.

For recording system control, the slave CPU controls most of the signals output to the thermal head, transfers image data from the line memory to the shift register in the thermal head at a high speed, and furnishes recording operation strobe signal to initiate recording. To prevent print tone variation due to head temperature, print cycle period, head resistance, or number of dots, the slave CPU accepts these parameters to control the strobe signal according to the appropriate algorithm.

**Mechanical control CPU port description**

**μPD 8749 (IC45)**

| Signal name | Port name | I/O | Description |
|---|---|---|---|
| NAK | P11 | O | Negative acknowledge to command input |
| STRB | P12 | O | Thermal head strobe gate signal |
| $\overline{\text{CGATE}}$ | P13 | O | Thermal head shift clock gate signal |
| DGATE | P14 | O | Thermal head transfer data gate signal |
| ACK | P15 | O | Affirmative acknowledge to command input |
| LATCH | P16 | O | Thermal head latch signal |
| LOAD | P17 | O | SIO CTSB signal |
| SRRDY | P24 | I | Transmission line start signal |
| PRDY | P25 | I | Receive/copy line start signal |
| SKIP | P26 | I | Command input |
| $\overline{\text{MORG}}$ | P27 | I | Document sensor input |
| $\overline{\text{MINT}}$ | $\overline{\text{INT}}$ | I | Command input |
| T512 | T1 | I | 480us clock input |
| 2-8 thru 2-1 | D0 thru D7 | I | Termal head thermistor voltage A-D conversion input |
| TPA<br>TPB<br>$\overline{\text{TPA}}$<br>$\overline{\text{TPB}}$ | D0 thru D3 | O | Transmission system pulse motor phase excite output |
| RPA<br>RPB<br>$\overline{\text{RPA}}$<br>$\overline{\text{RPB}}$ | D4 thru D7 | O | Receiving system pulse motor phase excite output |
| MODE 1 thru MODE 3 | P40 thru P42 | I | Command input |
| BQ6 thru BQ9 | P50 thru P53 | I | Recording dot counter input signal |
| SCP | P60 | O | AD converter start output signal |
| WCOM | P61 | O | Shading waveform write pulse |
| $\overline{\text{PGST}}$ | P62 | O | Shading waveform write page start signal |
| $\overline{\text{PME}}$ | P63 | O | Pulse motor enable when main power is on |
| STA thru STC | P70 thru P72 | O | Thermal head strobe decoder address signal |
| CLR | P73 | O | Recording dot counter clear signal |




**Copy mode timings**

**Mechanical control CPU command list**

| Command | MODE 3 | 2 | 1 | Skip | Operating mode | Description |
|---|---|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 | Standby mode | All ports are initial reset and the pulse motor phase excitation is turned off. |
| | | | | 1 | Shading waveform memory mode | Shading waveform input to memory |
| 1 | 0 | 0 | 1 | 0 | Receive mode (FINE) | Receive operation in FINE mode |
| | | | | 1 | Receive mode (STD) | Receive operation in STD mode |
| 2 | 0 | 1 | 0 | 0 | Transmit mode (FINE) | Transmit operation in FINE mode |
| | | | | 1 | Transmit mode (STD) | Transmit operation in STD mode |
| 3 | 0 | 1 | 1 | 0 | Copy mode (FINE) | Copy operation in FINE mode |
| | | | | 1 | Copy mode (STD) | Copy operation in STD mode |
| 4 | 1 | 0 | 0 | 0 | Document set mode | Document inserted to the scan start position |
| | | | | 1 | Document release mode | Document ejected |
| 5 | 1 | 0 | 1 | 0 | Document insert mode | Document inserted to the sensor position |
| | | | | 1 | Recording paper on position mode | Recording paper fed back from the cutter positio to recording position |
| 6 | 1 | 1 | 0 | 0 | Paper release mode | Paper fed to the cutter position |
| | | | | 1 | Paper feed mode | Lead edge blank (7mm) furnished to paper |
| 7 | 1 | 1 | 1 | 0 | G2 receive mode | Receive operation in G2 mode |
| | | | | 1 | Thermal head temperature sense | Checks the thermal head temperature if it exceeds the given limit. |

## 3-7. Panel control block

The panel control block is driven by the sub-5V supply and controls on/off of the main power supply. Also, the timer is controlled. The IC28 (8255) is operated in the mode 2, and the port A is interfaced with the main 5V supply. The sub-5V system reset signal is generated in the reset IC (TR2). Reset is cancelled in 20 to 30 msec after the sub-5V supply turned to 4.5V.
The main 5V system is controlled by the panel CPU (IC5). The CPRST (CPU reset) is cancelled in 50 msec after the main 5V has turned on, and MRST (mechanism reset) is cancelled in 5 msec after the reset of CPRST.
The following describes about the operation keys on the panel.

| Name | Function |
|---|---|
| START | Pushed to start receiption or transmission.<br>When the button is pressed with document in the hopper, it goes into the transmit mode. When the button is pressed without a document in the hopper, it goes into the receive mode. |
| MODE | Used to choose the mode of transmission of copying. Choice of STANDARD, FINE, and HALF TONE is available.<br>Contrast is adjusted automatically.<br>When pushed without a document in the hopper, it functions to select the manual and automatic receive mode. |
| TALK | Pushed to make verbal contact before or after the operation.<br>When pushed in a middle of operation, talk mode is then reserved. |
| STOP | Pushed to stop the operation in a middle of operation. Depression of this switch shuts the line out and the machine goes into the standby mode.<br>If pushed in a middle of copying, it terminates the copying operation. |

- POLL (MODE + TALK)
  When the MODE switch is pressed in conjunction with the TALK switch, the machine then goes into the POLL mode. In this mode, polling is enabled at the receive side without attendance at the opposite side, if document(s) were loaded on the hopper at the transmit side.
  The TALK mode can also be serviced if the switch was pushed in a middle of operation.
- COPY (START + TALK)
  When the START switch is pressed in conjunction with the TALK switch, the machine then goes into the COPY mode.

## 3-8. G2 transmission control block

From this block is created the medium speed transmission timing and the image signal transmission clock.
For the G2 mode operation, image signal transmission and receiving clock is switched with the SLO signal which is 6.912 kHz and 10.368 kHz.
For image signal transmission and reception in the G2 mode, the channel A of the SIO is used, same as the G3 mode transmission.
The transmission data are output as MOUT from TXDA of the SIO, and then synthesized with synchronous signal to become G2TXD through IC43 (LZ92E33), further through IC9 (LS08), to be delivered to the modem as TXD. (G2GT is low in the G3 mode and high in the G2 mode.) The receive data are competely identical to the G3 mode, and MD signal is directly inputted to the SIO. The transmit/receive clock of the SIO (RXCA/TXCA) is changed to DCLK and MCLK with CGCLK for the G3 and G2/G1 mode.

## 3-9. Modem board (R96FAX) operational description

The modem board has the following modulation and demodulation functions.

| No. | Communication mode | Baud rate (bps) | Modulation method | Modulation speed (bauds) | Carrier frequency (Hz) | Applicable CCITT recommendation |
|---|---|---|---|---|---|---|
| 1 | G3 | 9600 | 16 value QAM | 2400 | 1700 | V29 |
| 2 | G3 | 7200 | 8 value QAM | 2400 | 1700 | V29 |
| 3 | G3 | 4800 | 8 value PSK | 1600 | 1800 | V27 ter |
| 4 | G3 | 2400 | 4 phase PSK | 1200 | 1800 | V27 ter |
| 5 | G3 | 300 | FSK | 300 | 1650/1850 | V21 |
| 6 | G2 | | AM-PM-VSB | | 2100 | T3 |

In addition to the above functions, it has the tone transmit and tone detect functions.

Tone transmit

| No. | Signal name | Frequency |
|---|---|---|
| 1 | CED | 2100Hz |
| 2 | CI | 1850Hz |
| 3 | GC | 2100Hz |
| 4 | CFR | 1650Hz |
| 5 | MCF | 1650Hz |
| 6 | LCS | 110Hz |
| 7 | EOM | 1100Hz |
| 8 | PIS | 462Hz |

Tone detection

| No. | Signal name | Frequency |
|---|---|---|
| 1 | GI | 1850Hz |
| 2 | CFR, MCF | 1650Hz |
| 3 | GC | 2100Hz |

Above functions are controlled as the main board master microprocessor (IC30) accesses the interface memory inside the modem via the data bus. The interface memory consists of 32 8-bit registers which are controlled by selecting bank; register is selected by the 4-bit register select signal (RS3 - RS0) and chip select signal (CS0, CS1). These registers control the following:

1) Configuration register
   V29, V27, G2, FSK, and tone transmission mode assignment.
2) Option register
   Equalizer method, carrier detect threshold, suffix of echo suppressor protect tone, and transmit and receive mode setting.
3) Others
   G2AGC control, tonal frequency, etc.

By reading data from these registers via the data bus, the state of the modem is monitored for line tone detection and training pattern detection.

The following discusses the transmit and receive operations:

In the case of transmission, the transmit data (TXD) is given to the modem in synchronization with the data clock (DCLK) from the control board. The signal is then modulated and the transmit analog output (TXA) is given to the LIU board.

In the case of reception, the received analog input (RXA) is given to the modem from the LIU board. The signal is modulated and the received data are given to the control board in synchronization with the data clock (DCLK).

For the G3 mode, transmit/receive data are supplied to the SIO (IC2) of the control board, and for the G2 mode, the data are supplied to the line memory. Carrier transmission is controlled by the send request signal (RTS) through the SIO. In the case of the G2 mode, carrier transmission is controlled by the interface memory via the data bus.

In the case of the G2 mode, the external G2 clock (XCLK) is given from the control board for better clock accuracy.

All above operations are achieved by two signal processors and one analog LSI on the modem board.

The next page shows the list of the interface signals.

Transmit output level calibration attenuator and the PIS detect circuit are contained in the LIU board.

Interface signal list (Modem board)

| Signal name | I/O | Pin No. | Description |
|---|---|---|---|
| A. Power supply, reset | | | |
| GND | I | 14, 39 | GND |
| +5V | I | 3, 4 | +5V supply |
| +12V | I | 26 | +12V supply |
| −12V | I | 37 | −12V supply |
| $\overline{POR}$ | I/O | 36 | Power-on-reset |
| B. Microprocessor interface | | | |
| D7 | I/O | 7 | Data bus (8-bit) |
| D6 | I/O | 5 | Data bus (8-bit) |
| D5 | I/O | 9 | Data bus (8-bit) |
| D4 | I/O | 31 | Data bus (8-bit) |
| D3 | I/O | 15 | Data bus (8-bit) |
| D2 | I/O | 28 | Data bus (8-bit) |
| D1 | I/O | 23 | Data bus (8-bit) |
| D0 | I/O | 29 | Data bus (8-bit) |
| RS3 | I | 30 | Register select (4-bit) |
| RS2 | I | 8 | Register select (4-bit) |
| RS1 | I | 27 | Register select (4-bit) |
| RS0 | I | 10 | Register select (4-bit) |
| $\overline{CS0}$ | I | 6 | Bank 0 chip select |
| $\overline{CS1}$ | I | 18 | Bank 1 chip select |
| READ | I | 1 | Read enable |
| $\overline{WRITE}$ | I | 2 | Write enable |
| $\overline{IRQ}$ | O | 32 | Interrupt request |
| C. V24 interface | | | |
| DCLK | O | 13 | Data clock |
| XCLK | I | 22 | External G2 clock |
| $\overline{RTS}$ | I | 19 | Request to send |
| $\overline{CTS}$ | O | 17 | Clear to send |
| TXD | I | 20 | Transmit data |
| RXD | O | 21 | Receive data |
| $\overline{RLSD}$ | O | 16 | Receive carrier detect |
| D. Cable equalizer | | | |
| CABS1 | I | 33 | Cable select-1 |
| CABS2 | I | 34 | Cable select-2 |
| E. Analog signal | | | |
| TXA | O | 38 | Transmit analog signal |
| RXA | I | 40 | Receive analog signal |
| AUXIN | I | 35 | Auxiliary analog input |
| F. Diagnostic signal | | | |
| EYEX | O | 24 | Eye pattern data, X axis |
| EYEY | O | 25 | Eye pattern data, Y axis |
| $\overline{EYECLK}$ | O | 11 | Eye pattern clock |
| EYESYNC | O | 12 | Eye pattern sync signal |

## 3-10. Gate array (LZ92E33) circuit

The following blocks are constructed on the gate array for achieving compactness.

a) Contact image sensor clock generation circuit
b) G2 clock generation circuit
c) Line memory address counter circuit
d) Thermal head clock counter
e) Thermal head dot counter circuit
f) Read and control signal circuit

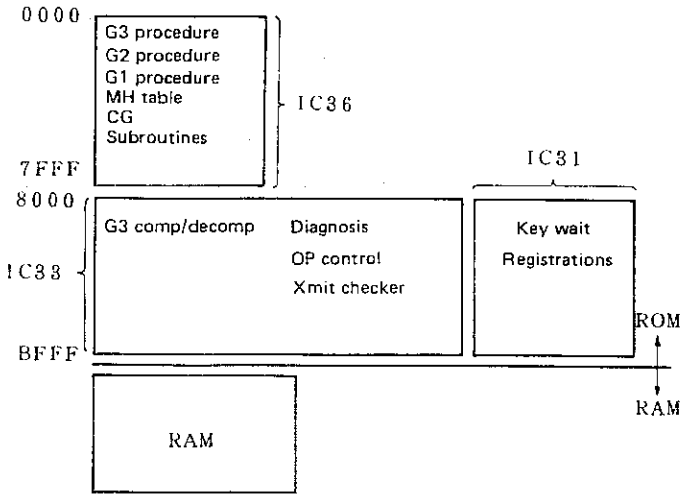
The following discusses gate array signal functions.

**LZ92E33 gate array I/O port assignment (IC43)**

| Pin No. | I/O | Signal name | Function |
|---|---|---|---|
| 1 | – | N.C. | – |
| 2 | – | N.C. | – |
| * 3 | I | XTAL | 8MHz clock input |
| 4 | O | $\overline{RCP125}$ | 800kHz clock output (cycle: 1.25us) |
| 5 | O | $\overline{CP25}$ | 400kHz clock output (cycle: 2.5us) |
| 6 | O | $\overline{CP5}$ | 200kHz clock output (cycle: 5us) |
| 7 | O | CL | Image sensor drive clock output ($\phi$CL) |
| 8 | O | $\overline{DIS}$ | Image sensor drive discharge output ($\phi$DIS) |
| 9 | O | $\overline{\phi SH}$ | Image signal sample hold output |
| 10 | O | WRP | OR memory/VPP memory write pulse signal |
| 11 | O | $\overline{\phi T}$ | Read circuit standard pulse (cycle: 9.77ms) |
| 12 | – | GND | – |
| 13 | O | $\overline{SP}$ | Image sensor drive start pulse output ($\phi$SP) |
| 14 | O | CK4M | 4MHz system clock output |
| 15 | O | GQ0 | OR memory/VPP memory address output (A0) |
| 16 | O | GQ1 | OR memory/VPP memory address output (A1) |
| 17 | O | GQ2 | OR memory/VPP memory address output (A2) |
| 18 | O | GQ3 | OR memory/VPP memory address output (A3) |
| 19 | O | GQ4 | OR memory/VPP memory address output (A4) |
| 20 | O | GQ5 | OR memory/VPP memory address output (A5) |
| 21 | O | GQ6 | OR memory VPP memory address output (A6) |
| 22 | – | N.C. | – |
| 23 | – | N.C. | – |
| 24 | O | GQ7 | OR memory/VPP memory address output (A7) |
| 25 | O | GQ8 | OR memory/VPP memory address output (A8) |
| 26 | O | GQ9 | OR memory/VPP memory address output (A9) |
| 27 | O | GQ10 | OR memory/VPP memory address output (A10) |
| 28 | O | GQ11 | OR memory/VPP memory address output (A11) |
| 29 | I | ADJ | VPP memory address correction pulse input |
| 30 | I | TEST | Test pin (to be used in low level) |
| 31 | O | BQ9 | Thermal head black dot count output (Q9) |
| 32 | O | BQ8 | Thermal head black dot count output (Q8) |
| 33 | O | BQ7 | Thermal head black dot count output (Q7) |
| 34 | O | BQ6 | Thermal head black dot count output (Q6) |
| 35 | I | CLR | Thermal head black dot counter clear input |
| 36 | O | PCLK | Thermal head drive shift clock output (CLOCK) |
| 37 | I | VCLK | Thermal head black dot counter clock input |
| 38 | O | XCLKM | Modem drive clock output (10.368Hz) (XCLK) |
| 39 | I | TO | Mechanical control CPU (8749) TO signal input (about 3.32MHz) |
| 40 | – | GND | – |
| 41 | I | ALE | Mechanical control CPU (8749) ALE signal input (about 633kHz) |
| 42 | I | $\overline{CGATE}$ | PCLK signal on/off input (H: PCLK = L, L: PCLK = pulse output |
| 43 | I | $\overline{G2DFM}$ | SMPLCK signal output select input (H: 10.368kHz, L: 5.184kHz) |
| 44 | I | SYCLK | XCLK/SMPLCK signal sync clear input |
| 45 | I | SLCT | SMPLCK signal output select input (H: 6.91kHz, L: 10.368kHz) |
| 46 | – | N.C. | – |
| 47 | – | N.C. | – |
| 48 | O | SMPLCK | G2/G1 mode sampling clock output |
| 49 | I | MPHS | G2/G1 mode control signal input (PHS output) |
| 50 | I | MPHC | G2/G1 mode control signal input (image signal output) |
| 51 | I | MOUNT | G2/G1 mode image signal input |
| 52 | O | SYNCO | G2/G1 mode sync signal output |
| 53 | O | G2TXD | G2 mode transmit signal output |
| 54 | I | MS1 | 2764 ROM output data select input (S1) |
| 55 | I | MS2 | 2764 ROM output data select input (S2) |
| 56 | I | MS3 | 2764 ROM output data select input (S3) |
| 57 | O | AQ0 | 2764 ROM address output (A0) |
| 58 | O | AQ1 | 2764 ROM address output (A1) |
| 59 | – | VCC | – |
| 60 | – | GND | – |
| 61 | O | AQ2 | 2764 ROM address output (A2) |
| 62 | O | AQ3 | 2764 ROM address output (A3) |
| 63 | O | AQ4 | 2764 ROM address output (A4) |
| 64 | O | AQ5 | 2764 ROM address output (A5) |
| 65 | O | AQ6 | 2764 ROM address output (A6) |
| 66 | O | AQ7 | 2764 ROM address output (A7) |
| 67 | O | AQ8 | 2764 ROM address output (A8) |
| 68 | O | AQ9 | 2732 ROM address output (A9) |
| 69 | – | N.C. | – |
| 70 | – | N.C. | – |
| 71 | O | AQ10 | 2764 ROM address output (A10) |
| 72 | I | AD0 | 2764 ROM data input (D0) |
| 73 | I | AD1 | 2764 ROM data input (D1) |
| 74 | I | AD2 | 2764 ROM data input (D2) |
| 75 | I | AD3 | 2764 ROM data input (D3) |
| 76 | I | AD4 | 2764 ROM data input (D4) |
| 77 | I | AD5 | 2764 ROM data input (D5) |
| 78 | I | AD6 | 2764 ROM data input (D6) |
| 79 | I | AD7 | 2764 ROM data input (D7) |
| 80 | I | $\overline{STVD}$ | Read signal start video signal input |
| 81 | I | $\overline{RIST}$ | Read signal line start signal input |
| 82 | I | $\overline{RDGT}$ | Read signal read gate signal input |
| 83 | I | $\overline{SCCLK}$ | Read signal sampling clock signal input |
| 84 | – | VCC | – |
| 85 | I | GATE | RXDB signal output select input (H: RXDB = inversion detect, L: RXDB = RVID) |

| Pin No. | I/O | Signal name | Function |
|---|---|---|---|
| 86 | O | RXDB | REad image signal data output (image buffer input data) |
| 87 | O | SYNCB | SIO read signal input external sync output |
| 88 | I | CGCLK | $\overline{RXCA}$ signal output select input (H: $\overline{RXCA}$ = SMPLCK, L: RXCA = DCLK) |
| 89 | I | DCLK | Modem transmit/receive clock input |
| 90 | O | $\overline{RXCA}$ | SIO transmit/receive clock output |
| 91 | O | RRDY | Read signal input period display output (read ready) |
| 92 | I | RVID | Read image signal data input |
| 93 | I | CLK1 | Test pin (normally used in high level) |
| 94 | I | $\overline{CLEAR}$ | Test pin (normally used in high level) |
| 95 | – | N.C. | – |
| 96 | – | N.C. | – |

## 3-11. ROM mapping




# [2] LIU CIRCUIT

## 1. General

Telephone interface circuitry for this facsimile is mounted on a single circuit board unit and is interfaced with the telephone line and facsimile circuits viz connectors. Connection to the switched telecommunication network is carried out by means of the magnetic relay. Power required for the control of the unit is supplied from the power supply unit of the facsimile.

## 2. Functions

- **Dialing**

Dialing is done on the telephone set that connected to the facsimile.

- **Ring detect**

As the ring detdet circuit is implemented in the unit, it allows automatic receive.

## 3. Operation theory

### 3-1. DC loop

The DC loop circuit consists of TB1, CML, CH1, R1 and TB2. The DC resistance (DCR) during the off-hook time shall be;

DCR : 260ohm ±35%

### 3-2. Ring detect

The ring detect circuit consists of C3, D1, D2, PC1, ZD1, R2, and R3. Ring detection is accompanied by ac coupling (via C3) the ring signal thru a half wave rectifier (D2) to drive the LED in optocupler (PC1). Collector current approportionate to light intensity flows through the optoransistor, and delivered as the CIU (calling indicat or) signal.

### 3-3. Connection

Connection of the facsimile to the telephone line is done by means of the CML relay, of which sequence is as described below.

(Connect)
Ring detect activation of START button – CMLRY low state (OV) – activation of the CML relay.

(Disconnect)
Completion or failure of facsimile communicaition – CMLRY to high state (ground) – deactivation of the CML relay.

### 3-4. Other descriptions

Isolation
Such as the relays (CML), optocupler (PC1) and isolation transformer (T1) that used on the telephone line side of isolation transformer (T1) have the antisurge strength of 3000Vrms against the facsimile side.

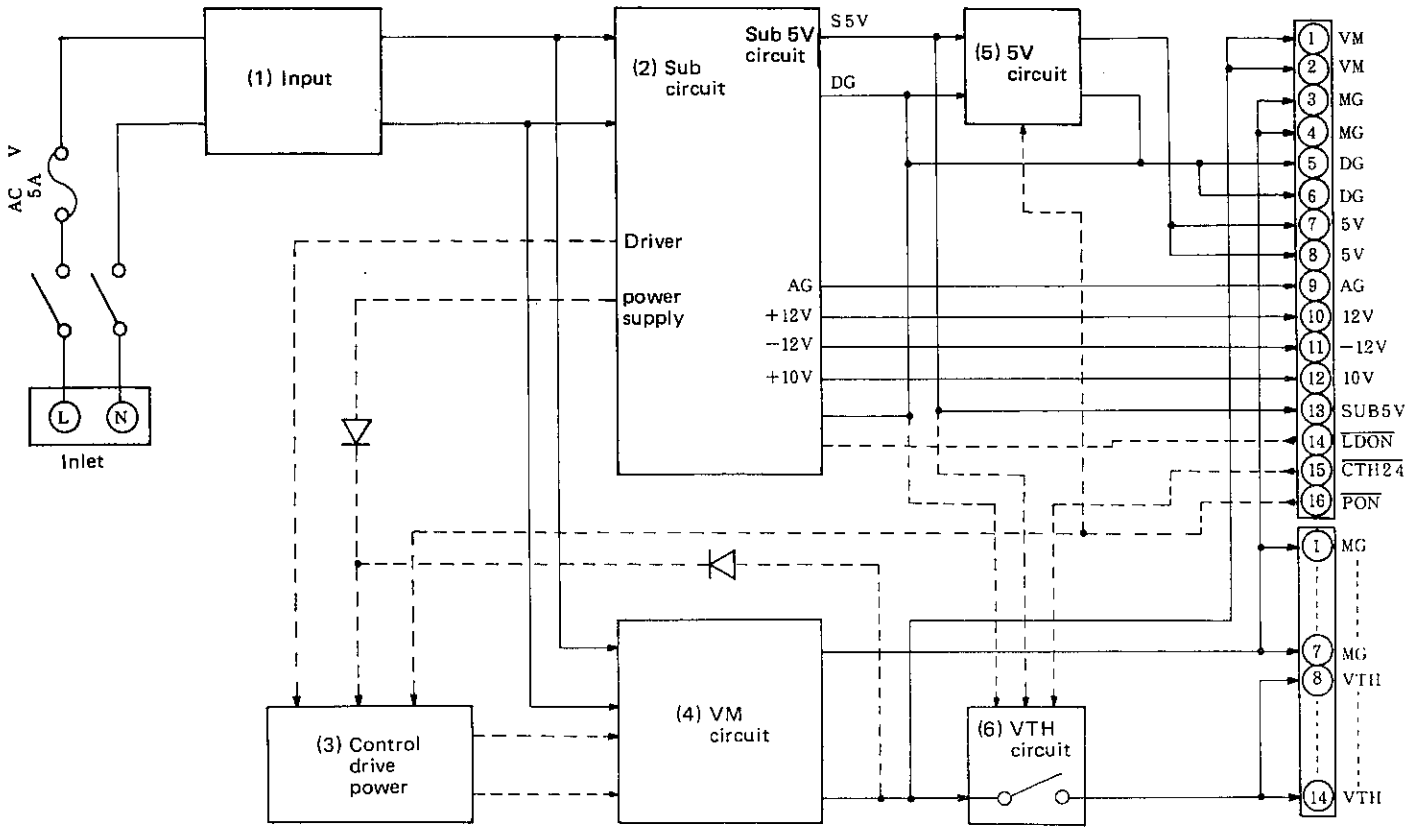
# [3] MODEM INTERFACE CIRCUIT

This board consists of an HIC (4M462C1, AFL86L3400D2, AFE312F2000A1) transmit a signal amplifier and receive signal amplifier.
TXOUT which is the transmit signal from the modem unit is adjusted to a range of – 6 to – 7dBm by a combination of resistors in the transmit amplifier. Here, only the G2 white can be adjusted by VR1 using C/$\overline{TONE}$. The signal is sent to the line transformer of the LIU PWB via the HIC 4M462C1. Transmit level can be adjusted in an increment of 2dB each using VR1, VR2, and dip switch located on the LIU PWB. A and AT1 ~ AT8 are connected to the dip switch of the LIU PWB.
The G2 PIS signal is used in this HIC. If PISGT were to be on for more than one second, it will be recognized by the panel CPU. The receive signal is received directly by the receive amplifier without going through the 4M462C1. Inside the 4M462C1, the receive signal is avoided to affect TXOUT using a hybrid circuit. The signal coming out of the receive amplifier is removed of the charge pulse in the AFL86L3400D2, corrected of a delay in the AFE312F2000A1, and operated to be at least in the minimum level (G3: – 46dBm, G2: – 51dBm) in the receive amplifier.

## [4] POWER SUPPLY

From the input source voltage of 170 to 280VAC the power supply unit supplies VM (24V, 0.8A), 5V (5V, 1.2A), +12V (12V, 0.16A), −12V (12V, 0.1A), sub-5V (5V, 0.5A), 10V (10V, 0.6A), and VTH (24V, 10A, peak pulse load).
VM and VTH outputs are derived by the half-bridge method, and other outputs by the ringing choke converter method.
It also incorporates the $\overline{\text{PON}}$ signal circuit to control the VM and 5V output, $\overline{\text{CTH24}}$ image signal circuit to supply VTH, and $\overline{\text{LDON}}$ signal circuit to control 10V supply.
The following discusses about operation of each block.

**Power supply unit block diagram**




### 1. Input block

It consists of the filter circuit and the rectifier/smoother circuit. The ac input voltage is rectified by the diode D1 (D5SB60(S)) and smoothed by the 330μF, 400WV, capacitor (C6). (D5SB60(S))
The thermistor TH-1 is used to prevent rush current from switch operation.

### 2. Sub-5V, ±12V circuits

These circuits are operated in the ringing choke converter method. By turning the transistor Q1 on and off in the given cycle, the transformer T1 is driven to obtain the required output.
The sub-5V output is detected and amplified by IC5. By controlling the on-cycle of the transistor Q1 by the photocoupler PC-1, input and output fluctuation is stabilized.

### 2-1. Sub-5V output

The sub-5V output is detected and amplified by IC5. By controlling voltage is adjusted with the potentiometer VR3.
Overvoltage protection is achieved by the use of the zener diode ZD1 and the photocoupler PC-1 and SCR1. Overcurrent protection is also achieved by restricting the Q1 base current with the transistor Q2 as the current is detected by the resistor R14, as current increase on the output side is considered increase on the primary side.

### 2-2. ±12V output

The ±12V output voltage is not adjustable though output is controlled by the 3-pin regulator IC2, IC3.

### 2-3. 10V output

Output is regulated by the transistor C6 and IC4. Normally, output is kept at zero by adding a higher voltage to the input of IC4 with R25 and D13. The transistor Q7 set active with appearance of the LDON signal which sets the IC4 input normal, to produce 10V supply.

### 3. Control and drive circuits

A switching pulse width modulation IC (TL494) is used. Two kinds of opposite phase control signals are created in the hybrid IC (IC1) with which driven the driver transformers T2 and T3 and further power transistors Q4 and Q5 of the VM circuit to do Half-bridge operation. This hybrid IC starts oscillating with the $\overline{\text{PON}}$ signal to deliver VM and 5V.

### 4. VM circuit

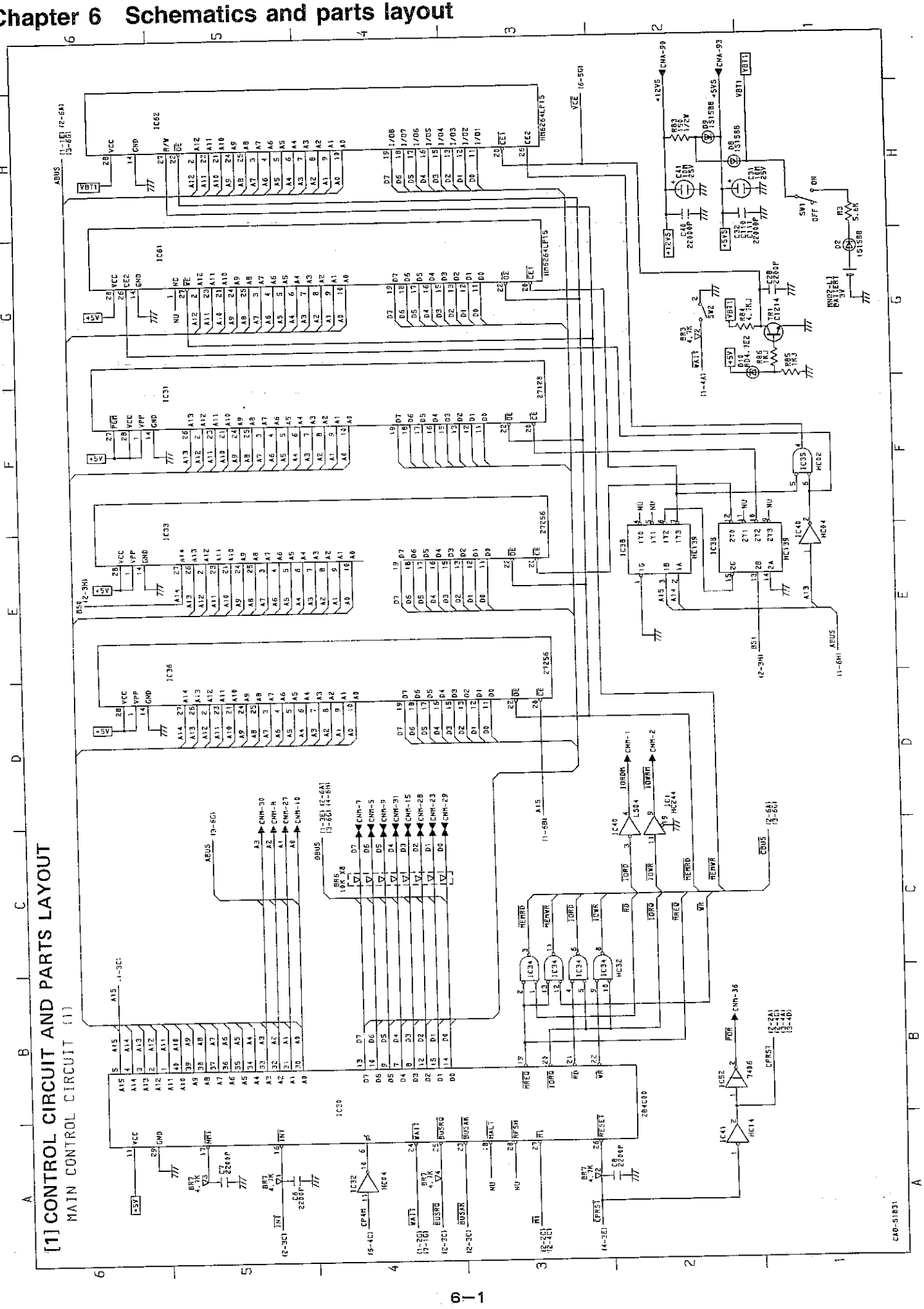
With a low state of $\overline{\text{PON}}$, a high oscillation frequency is produced with the half-bridge action which is conveyed to the secondary side output via the transformer T4 to create 24V output. Output voltage is adjusted by means of VR1. The overcurrent protective circuit is incorporated.

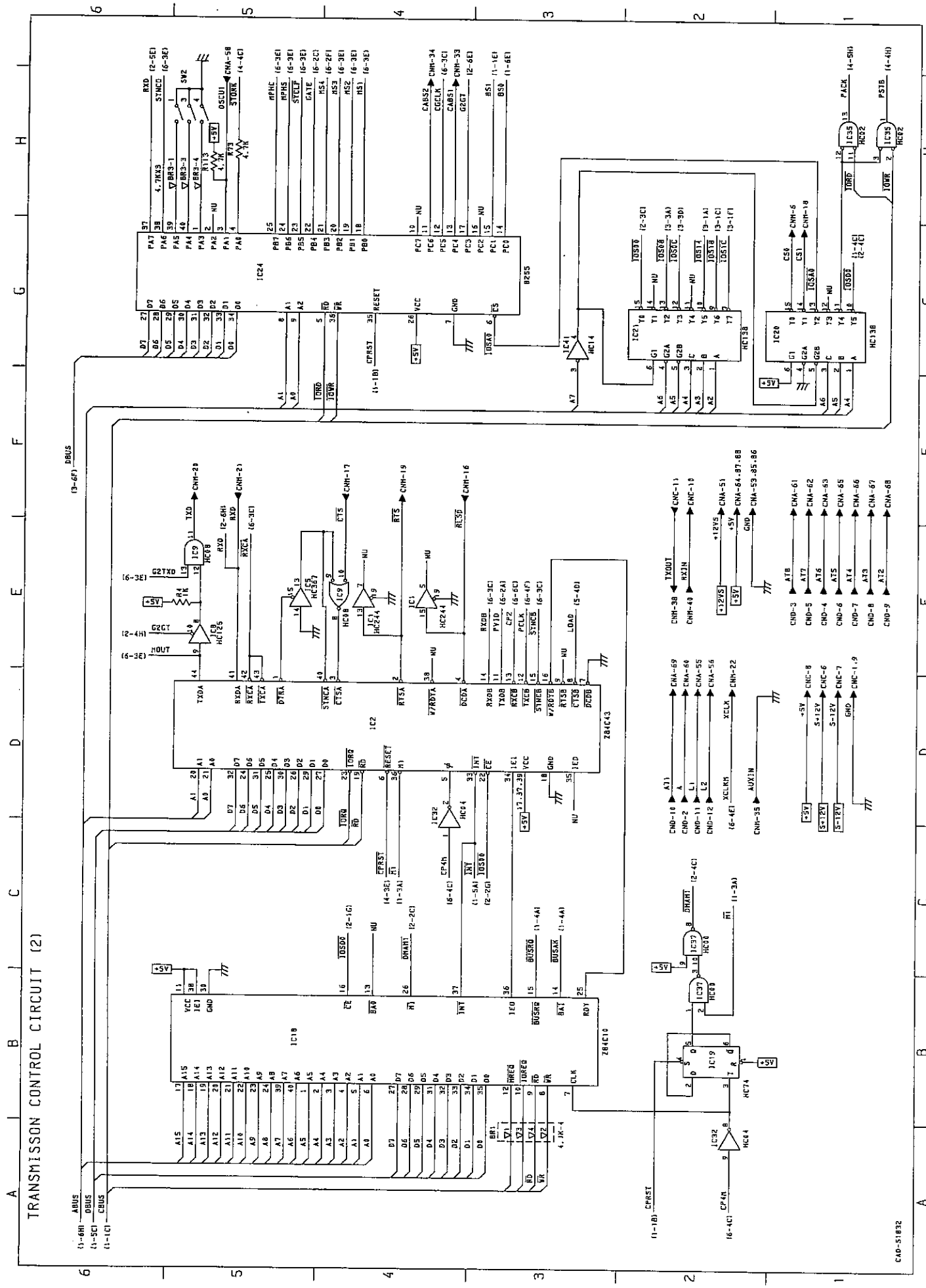
### 5. 5V circuit

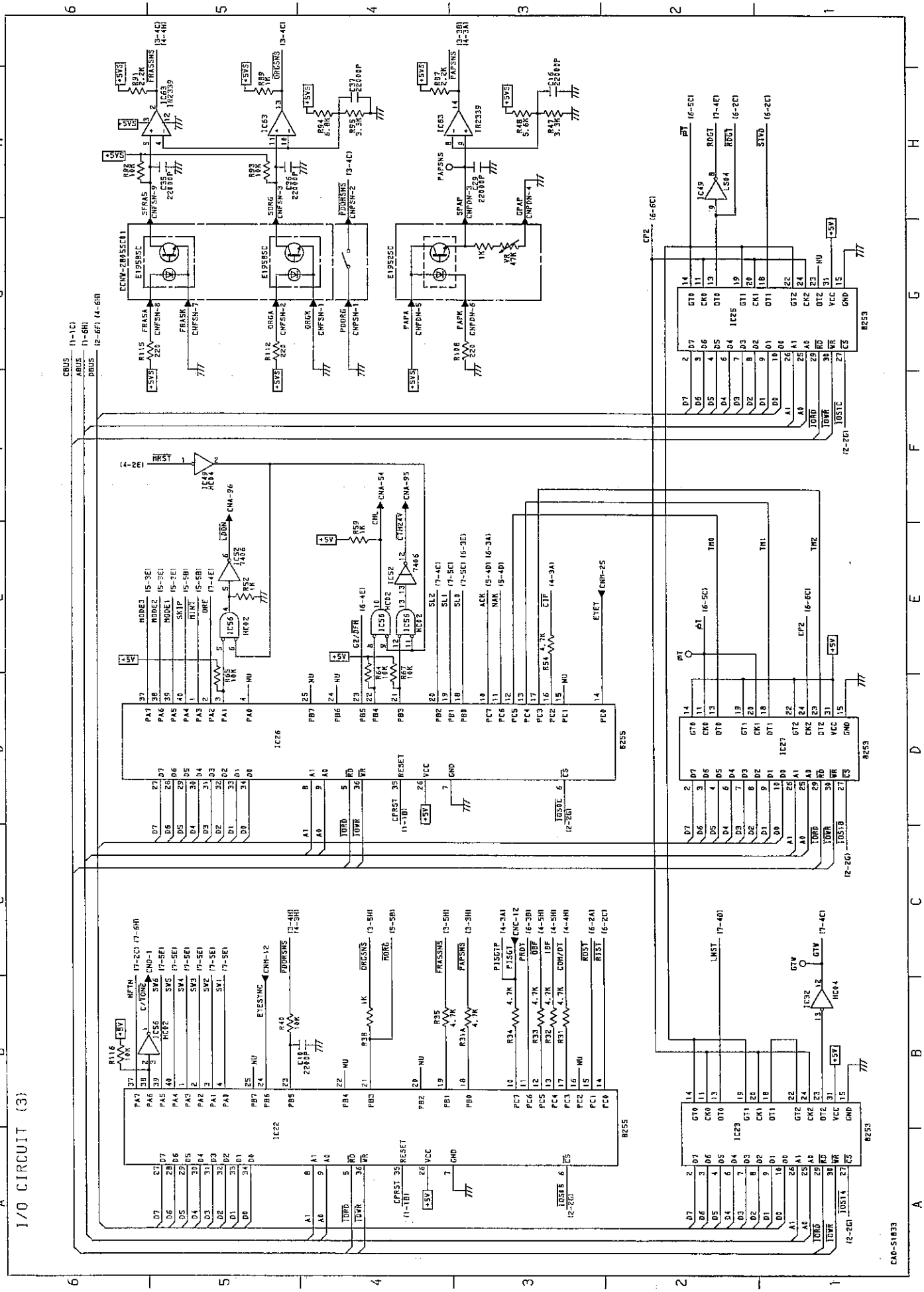
The sub-5V output is produced activating the transistor Q7 with a low state of $\overline{\text{PON}}$.

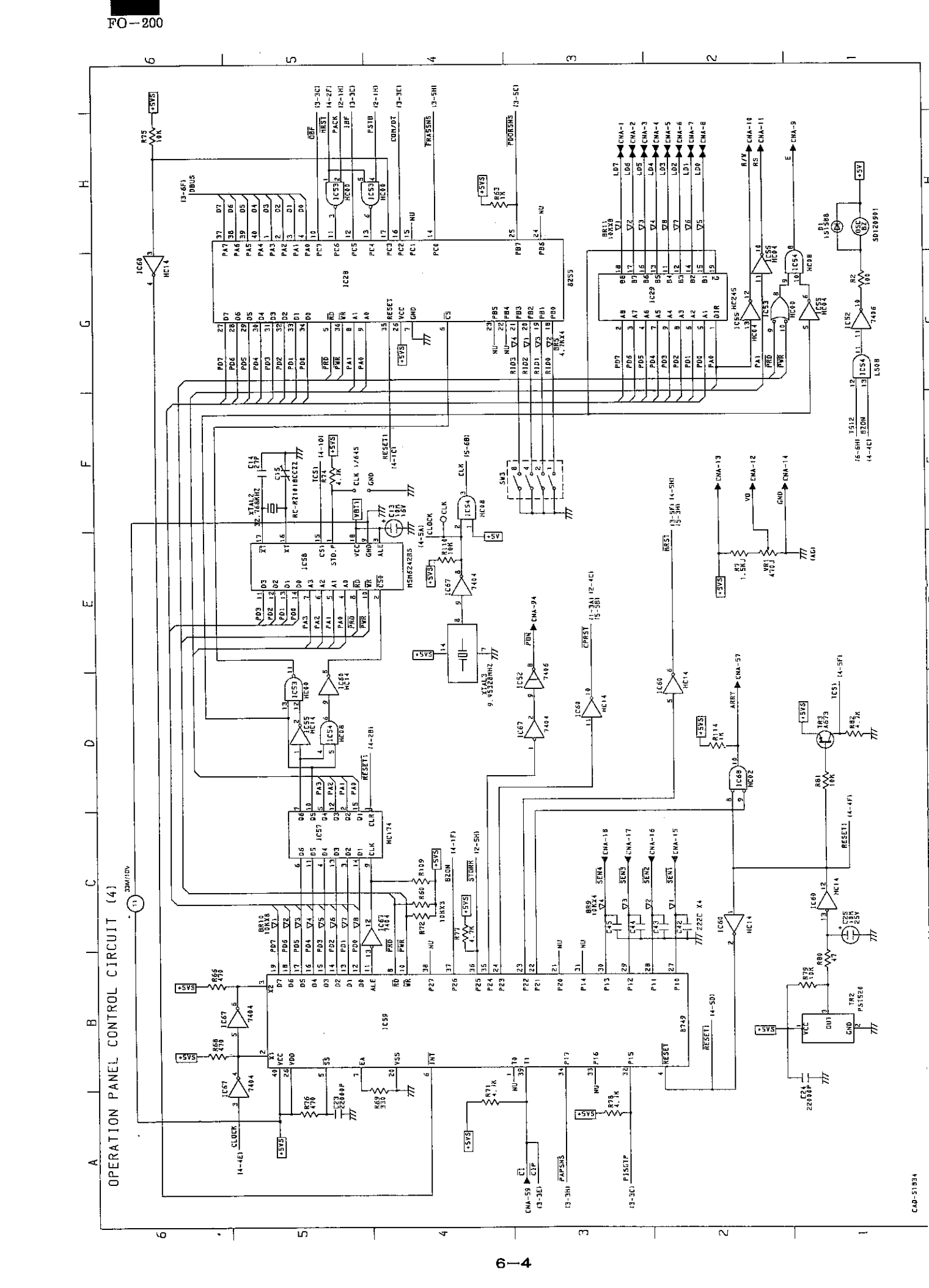
### 6. VTH circuit

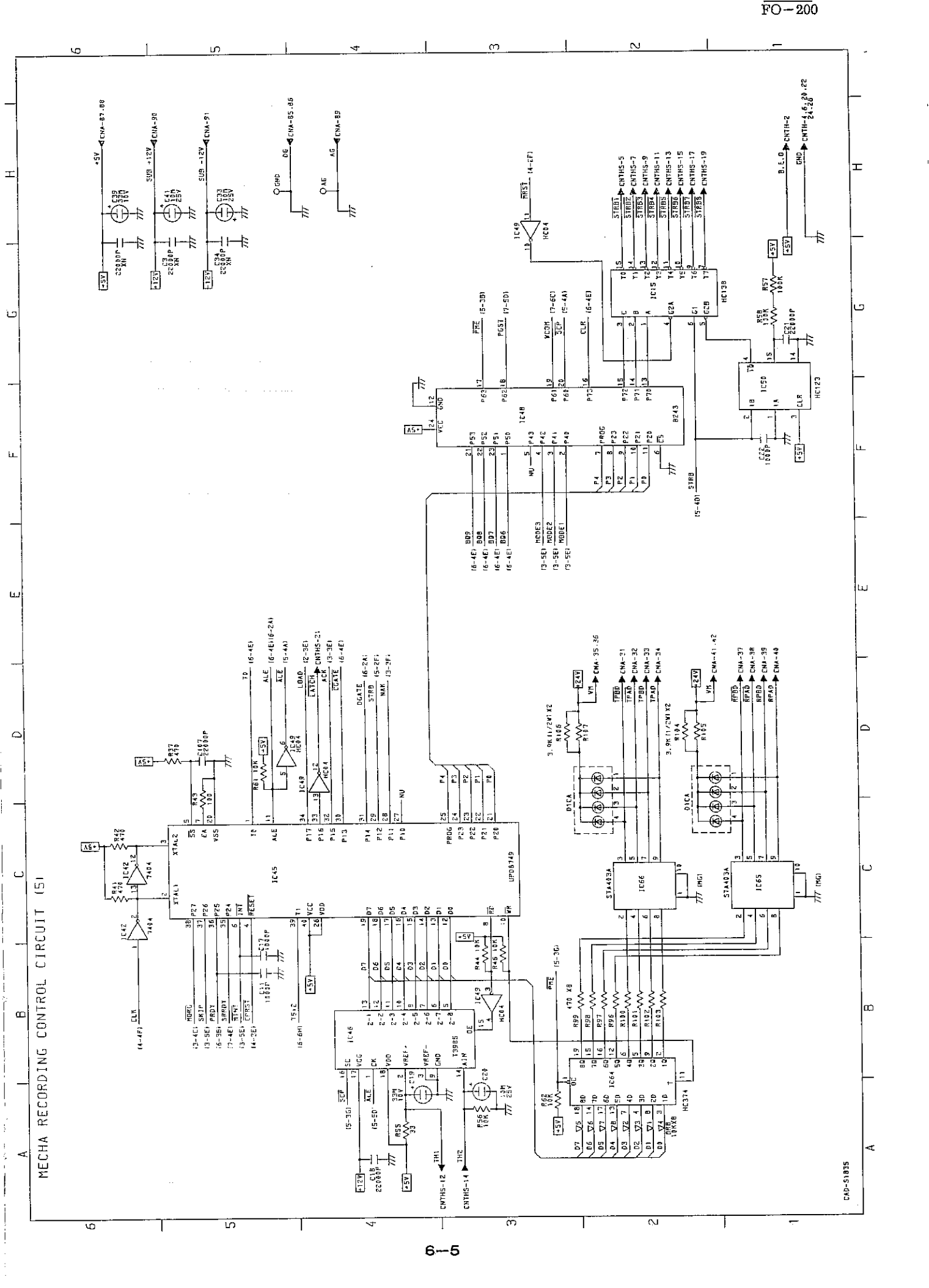
As a low state of signal is given to $\overline{\text{CTH24}}$, the relay RY1 is set active to obtain VTH from VM.

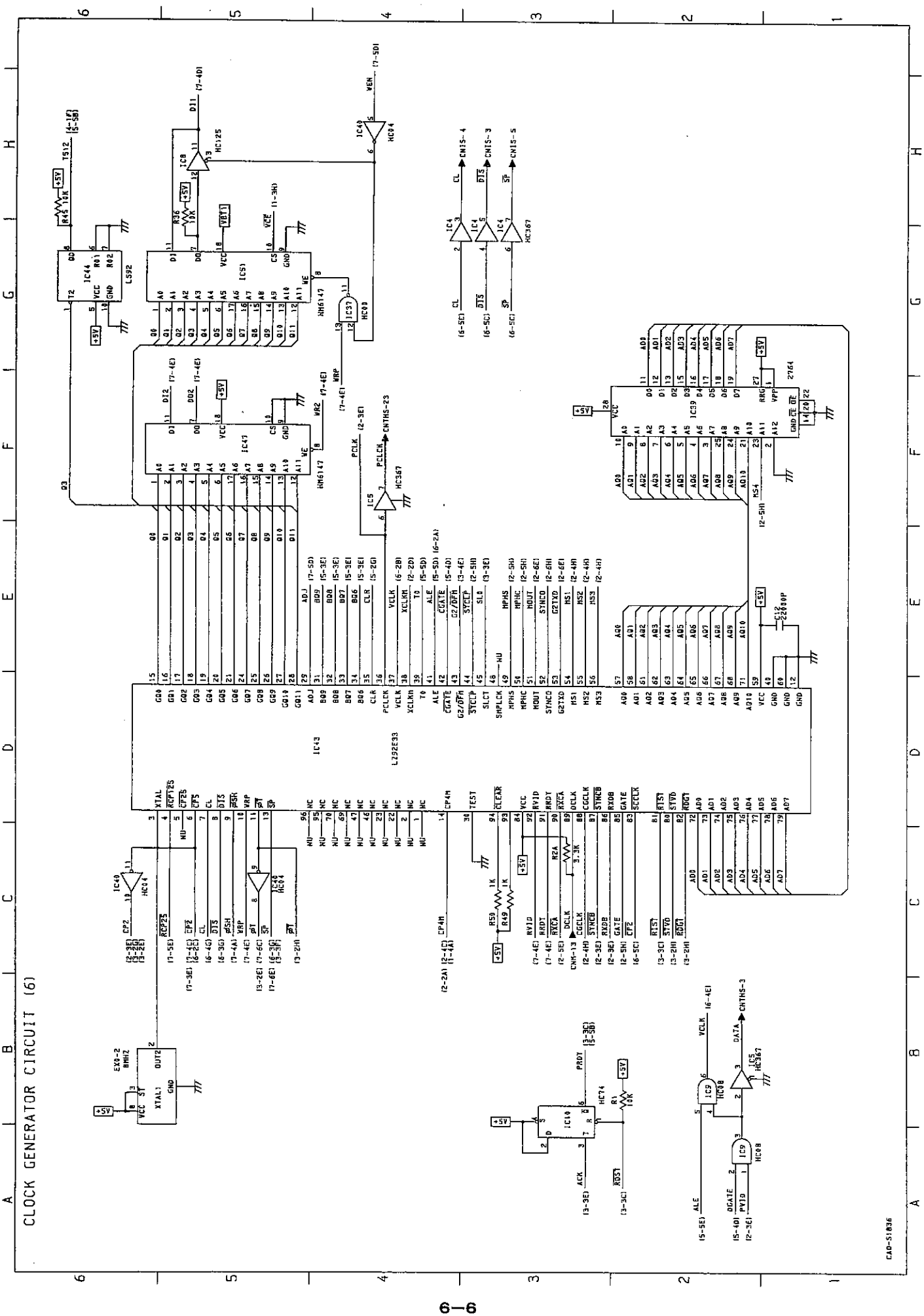

[1] CONTROL CIRCUIT AND PARTS LAYOUT
MAIN CONTROL CIRCUIT (1)
CA0-51831


TRANSMISSON CONTROL CIRCUIT (2)
CAD-51832


I/O CIRCUIT (3)
CAD-51833
IC26
IC22
IC23
IC25
IC27
8255
8253
IC63
IR2339
IC49
LS04
IC32
HC04
IC52
7406
IC56
HC02
IC64
HC14
E19585C
E19525C
CCNW-2B455CD1
+5V
GND
RD
WR
RESET
VCC
CS
D7
D6
D5
D4
D3
D2
D1
D0
A1
A0
IORD
IOWR
CPRST
CBUS
ABUS
DBUS


OPERATION PANEL CONTROL CIRCUIT (4)
C40-S1834


MECHA RECORDING CONTROL CIRCUIT (5)
CAD-51035


CLOCK GENERATOR CIRCUIT (6)
CAD-51836

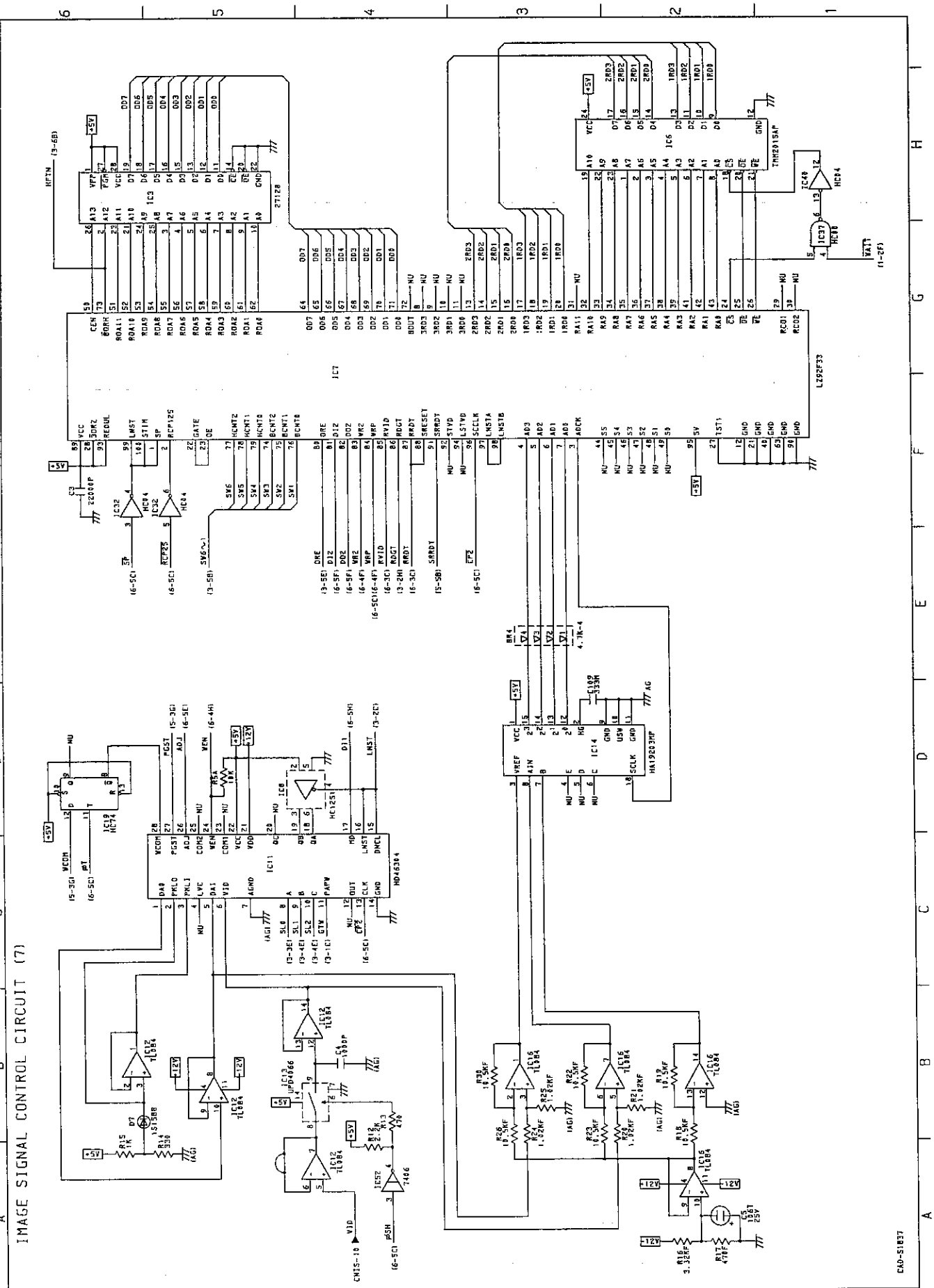
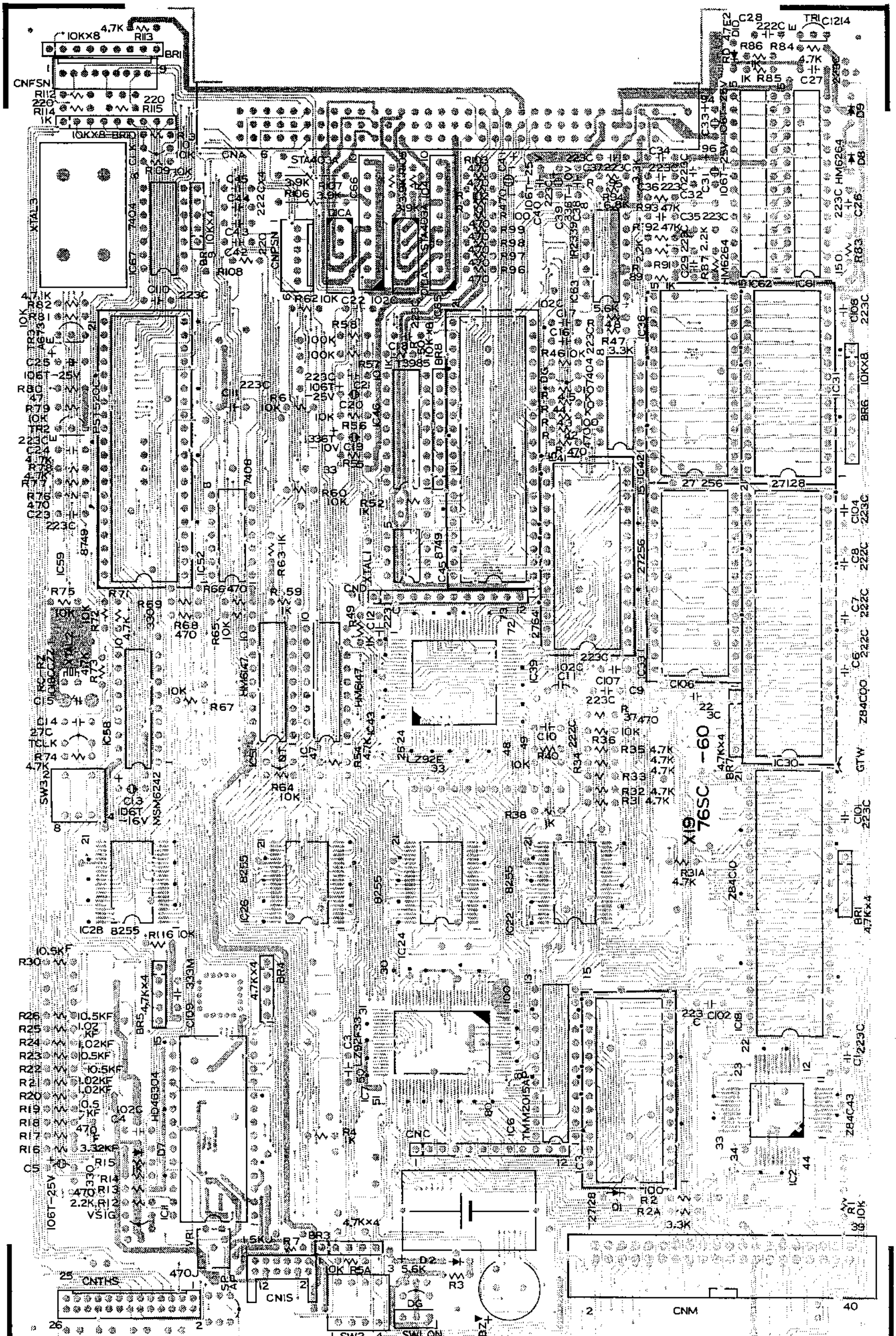
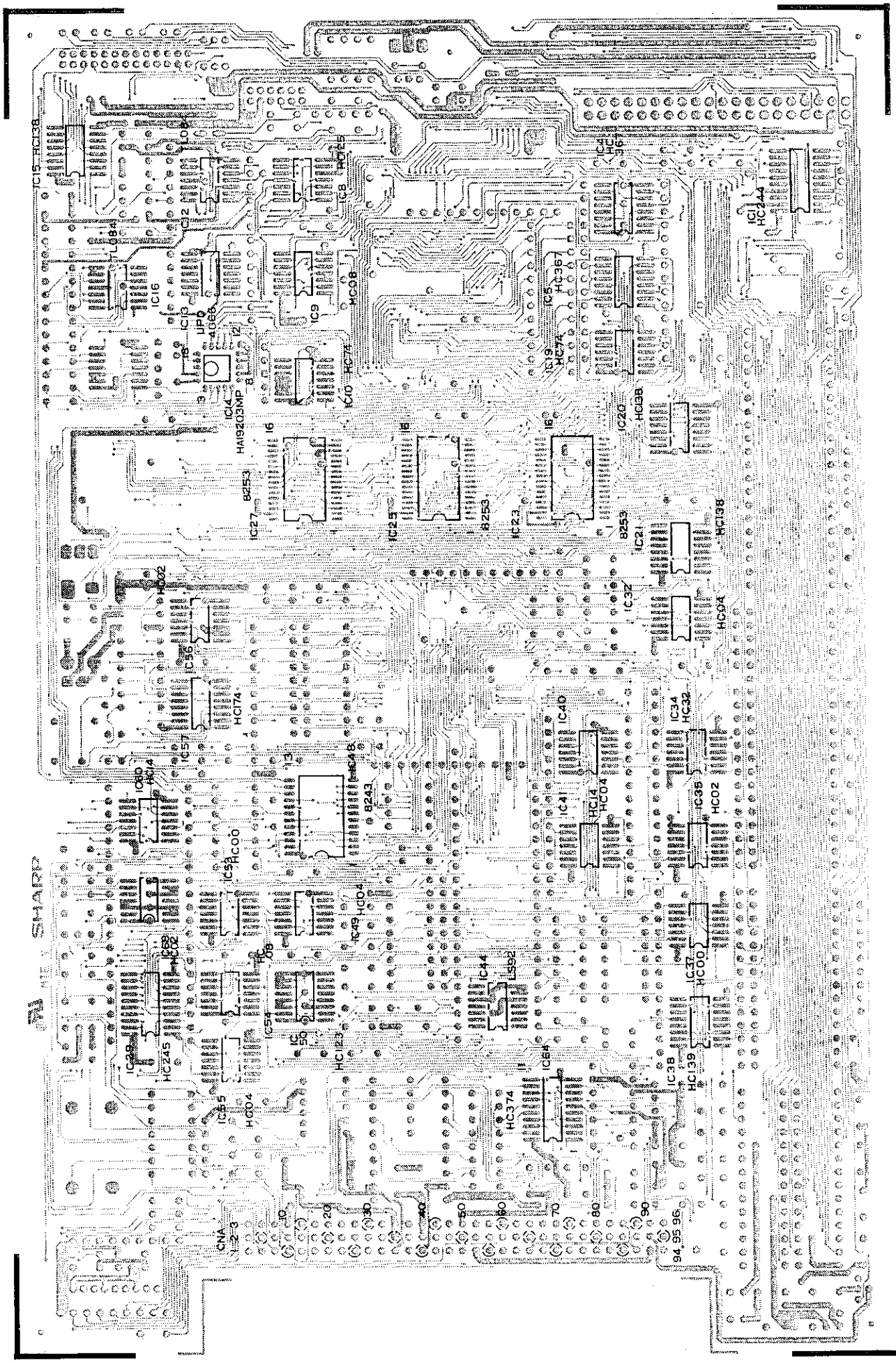


IMAGE SIGNAL CONTROL CIRCUIT (7)



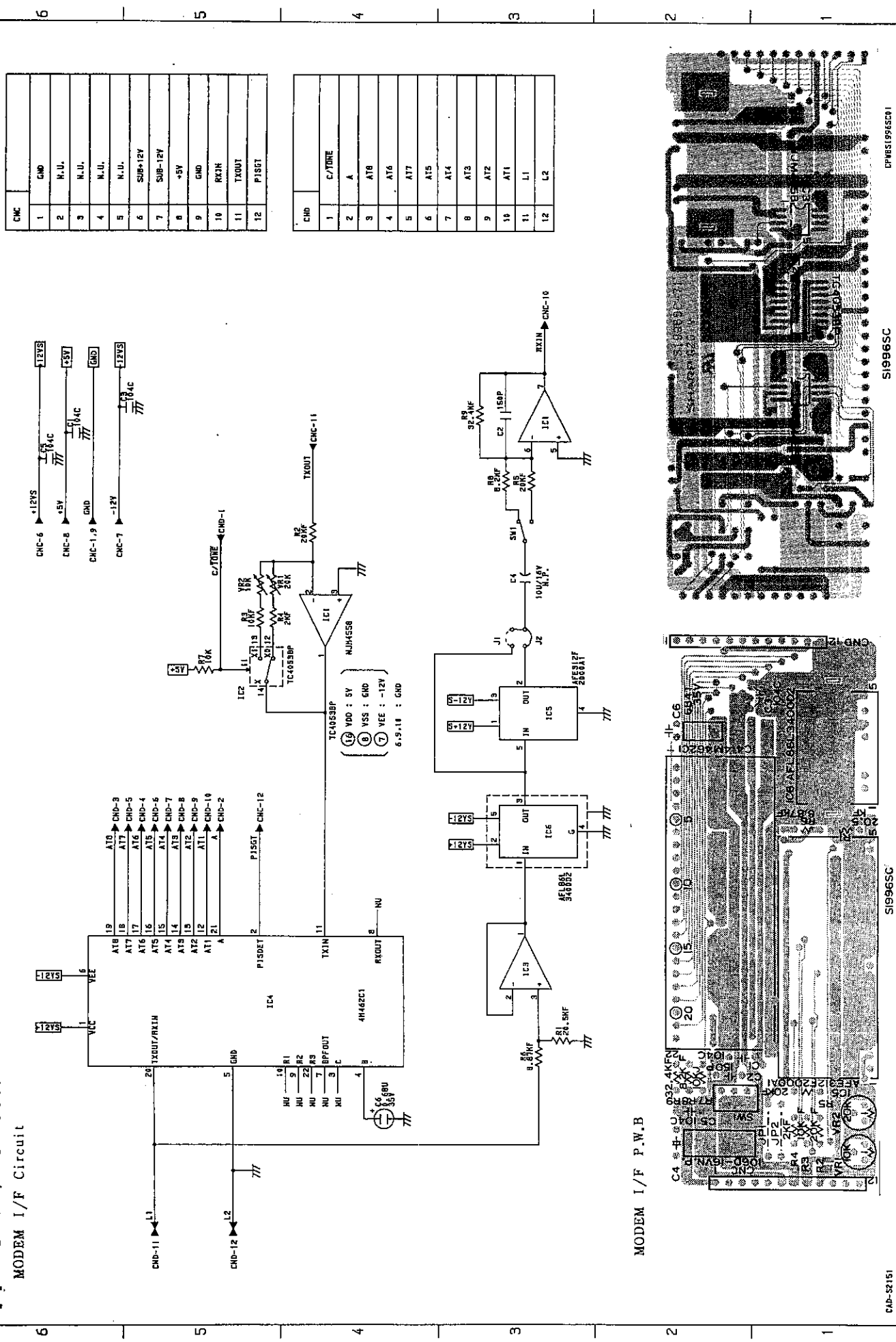

MAIN P.W.B (Top view)



MAIN P.W.B(Bottom view)

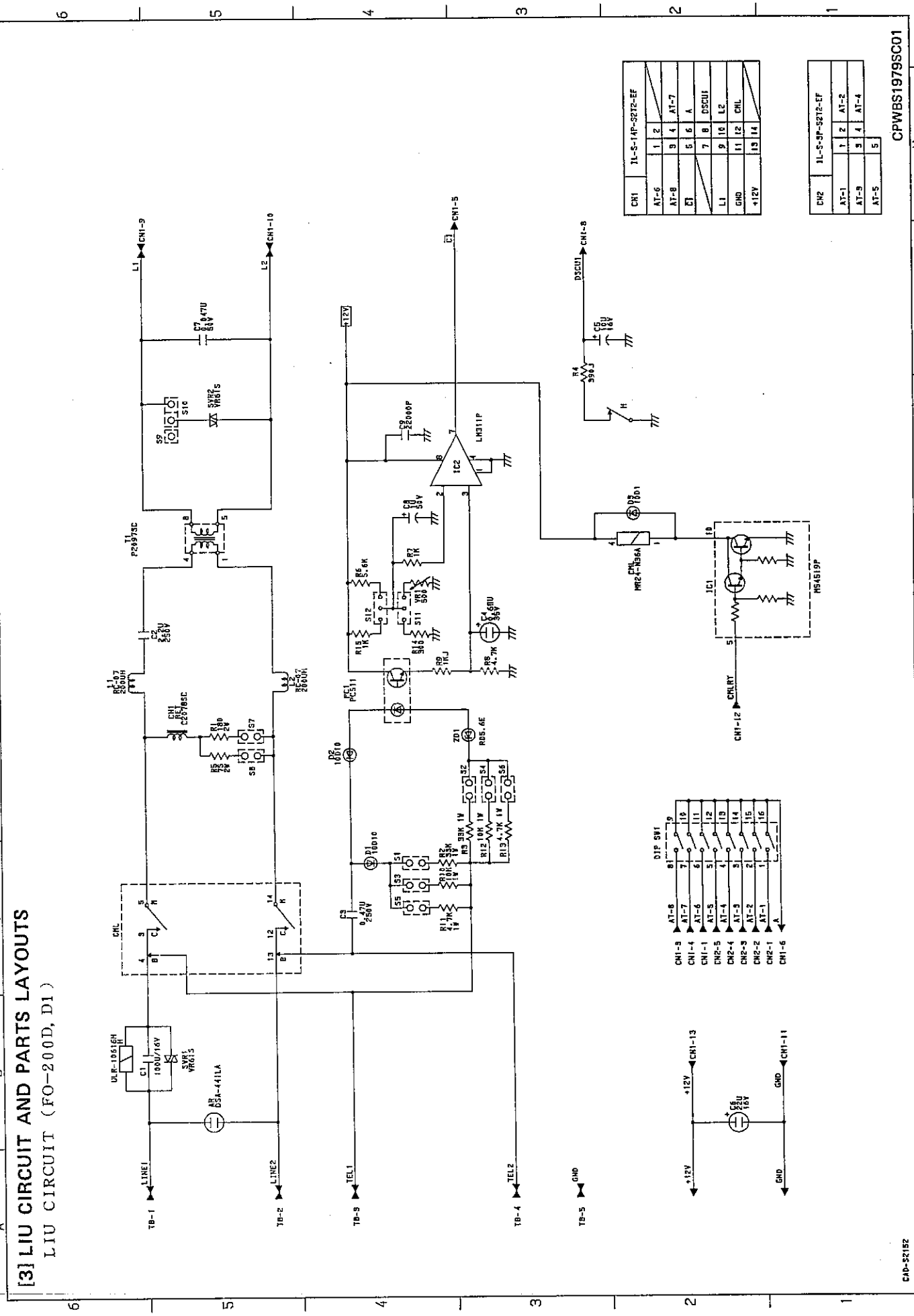
## [2] MODEM I/F CIRCUIT AND PARTS LAYOUT

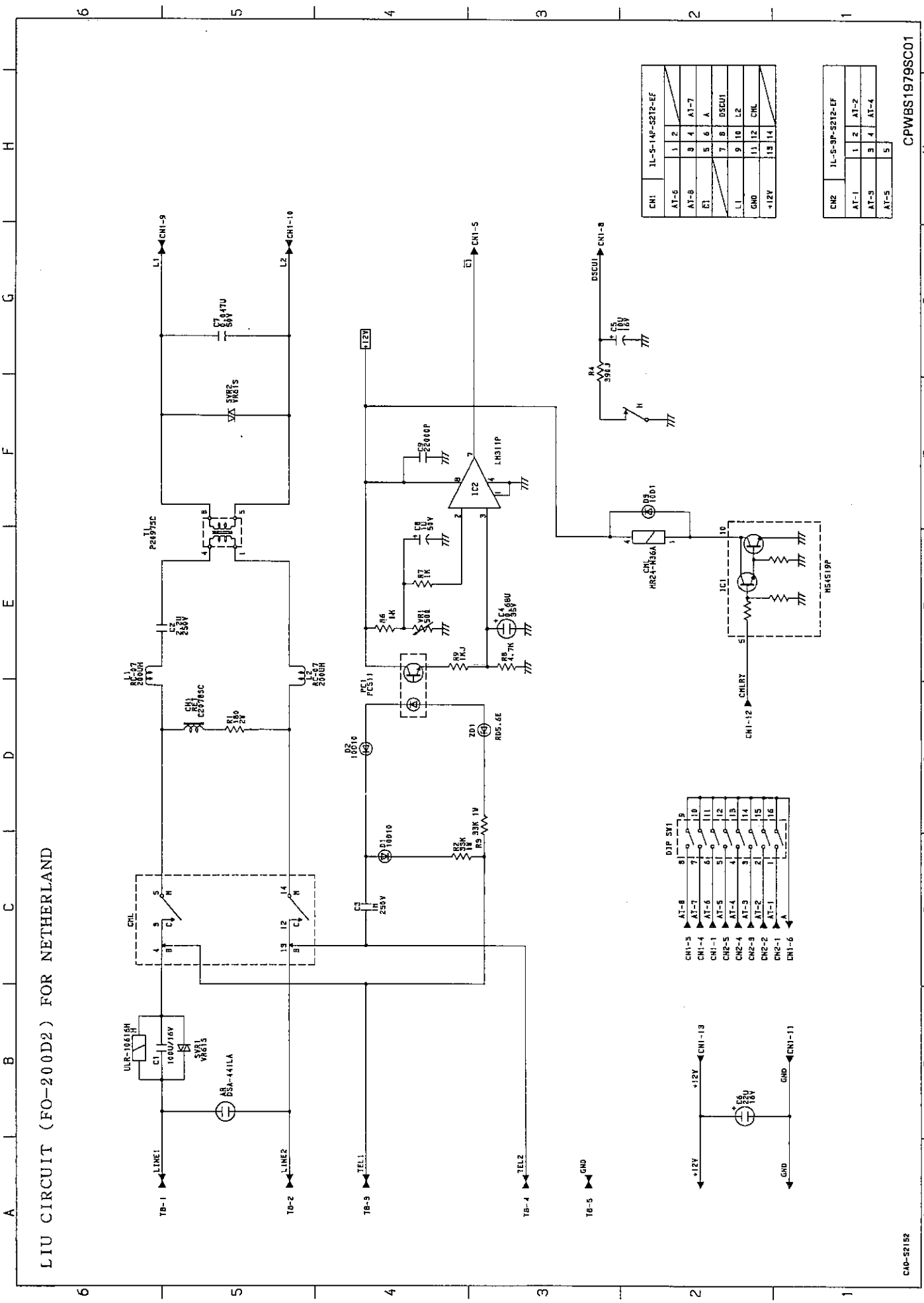
MODEM I/F Circuit



## [3] LIU CIRCUIT AND PARTS LAYOUTS

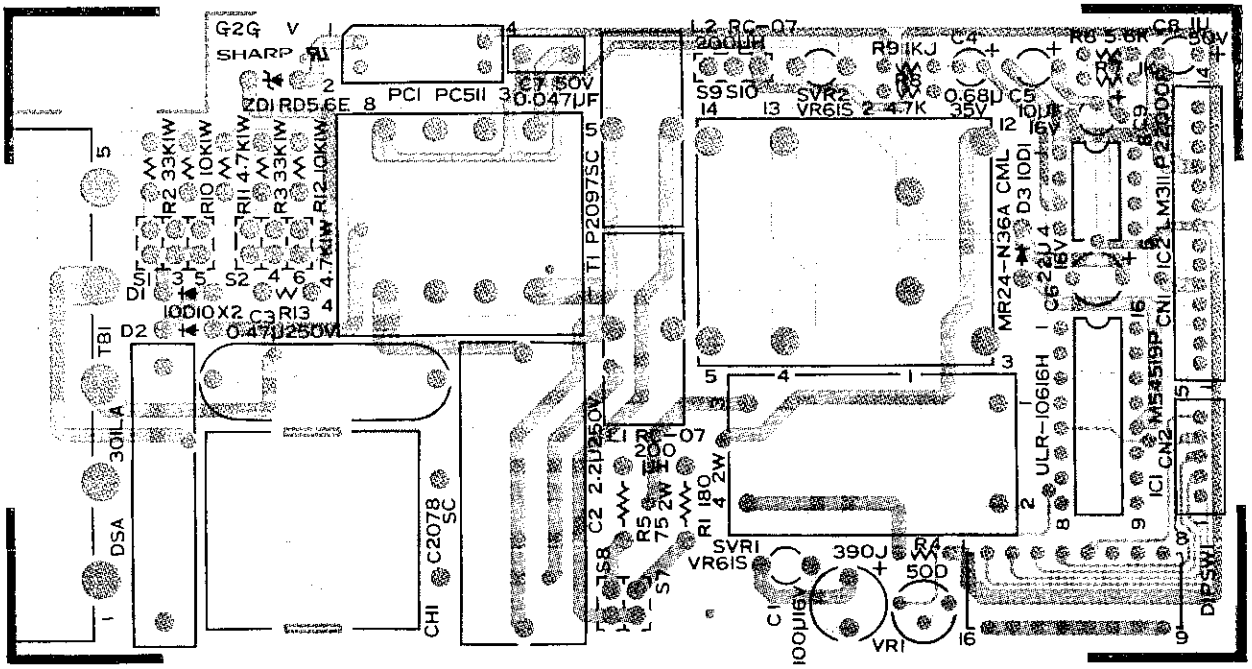
LIU CIRCUIT (FO−200D, D1)




LIU CIRCUIT (FO-200D2) FOR NETHERLAND
CPWBS1979SC01
CN0-52152
CN1 1L-S-14P-5212-EF
CN2 1L-S-9P-5212-EF
DIP SW1
IC1 MSM519P
IC2 LM311P
CML MR24-M36A
TB-1 LINE1
TB-2 LINE2
TB-3 TEL1
TB-4 TEL2
TB-5 GND

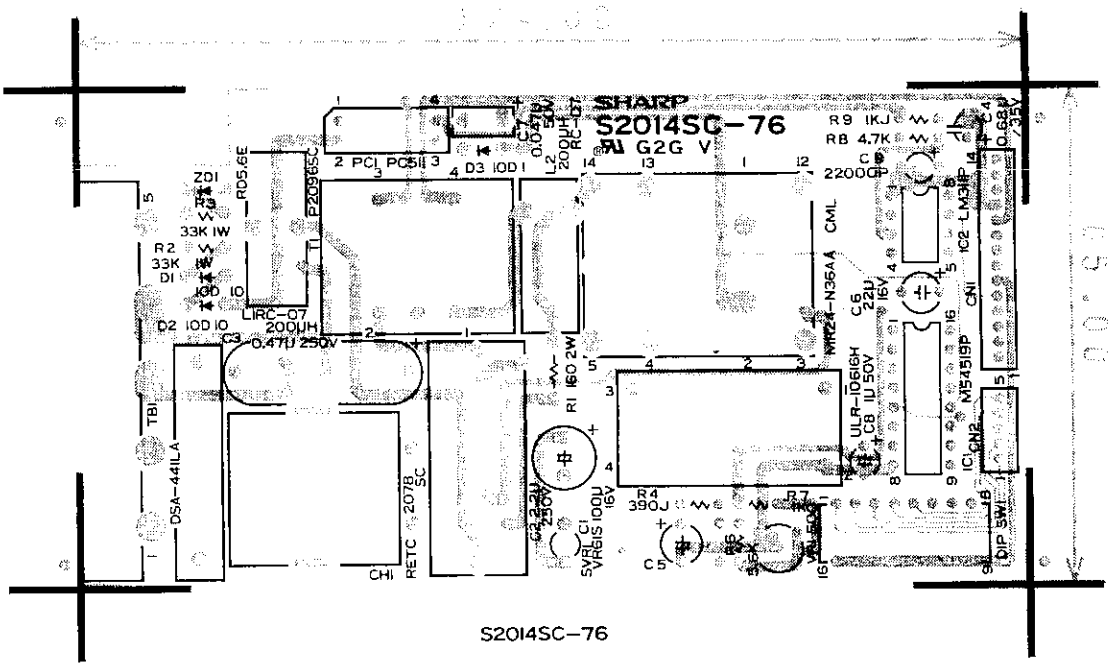
# LIU PWB LAYOUT

• FO-200D, D1




S1979SC

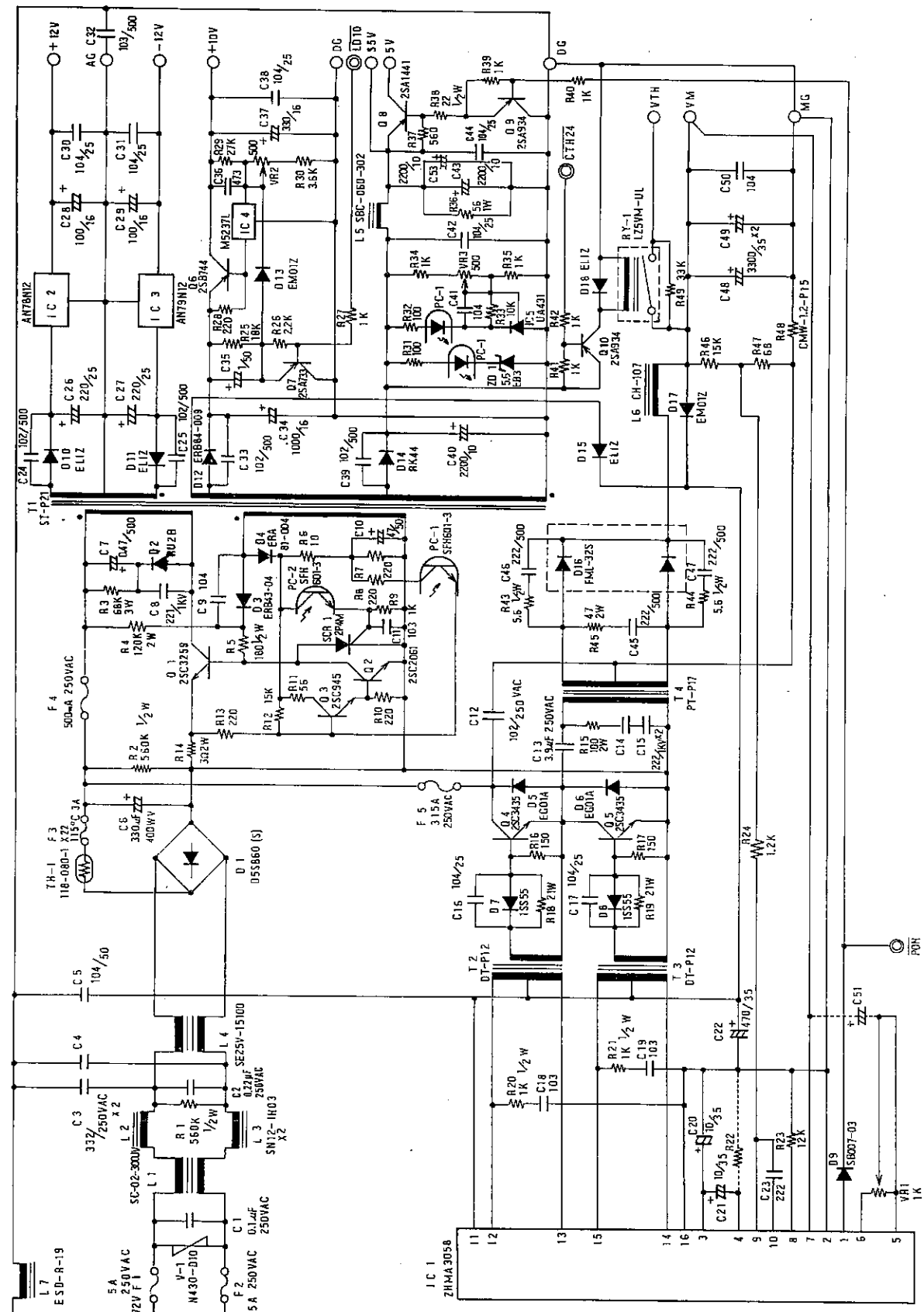
• FO-200D2 (FOR NETHERLAND)



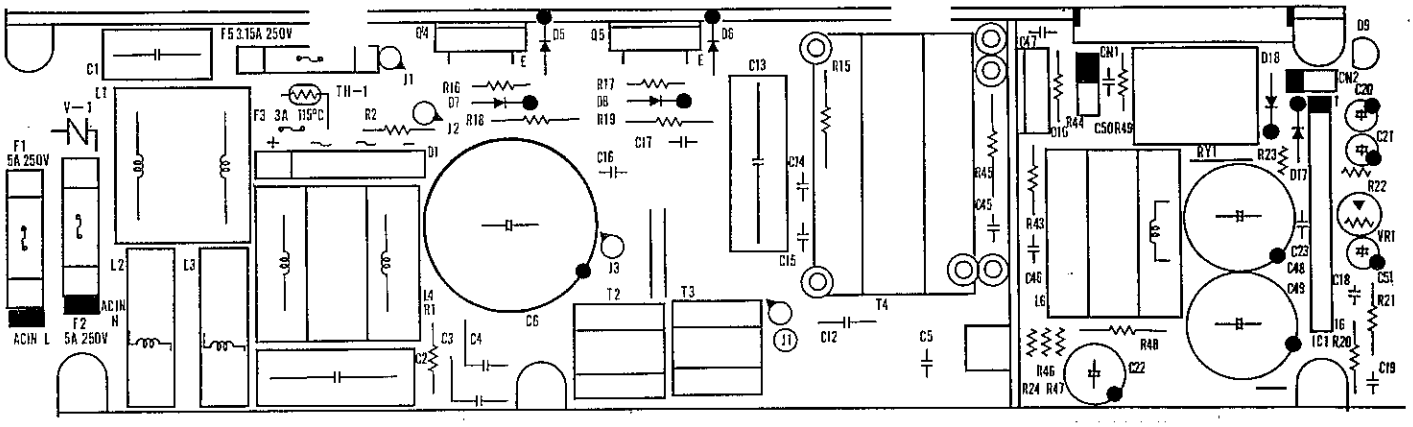

S2014SC-76

## [4] POWER CIRCUIT AND PARTS LAYOUT

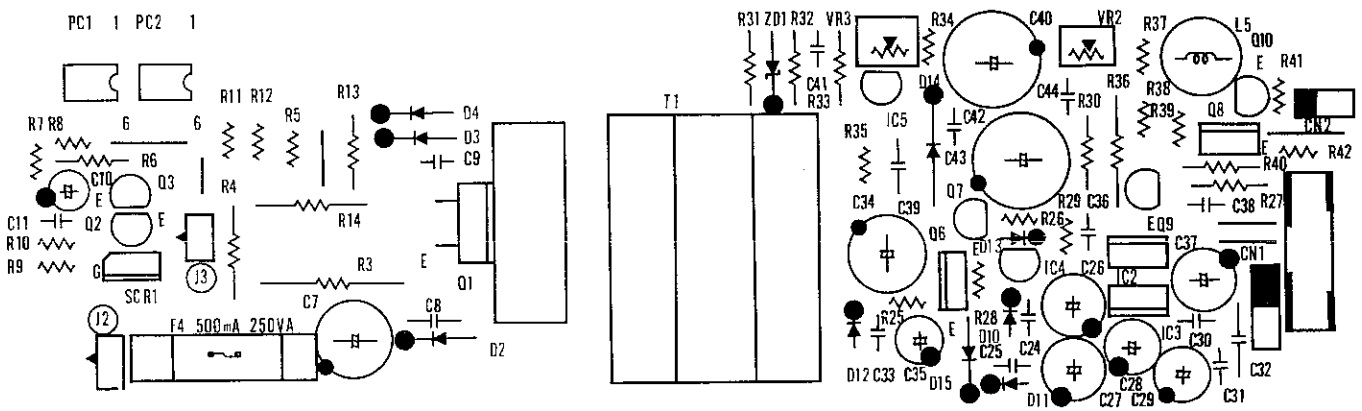
POWER CIRCUIT



POWER P.W.B(1)

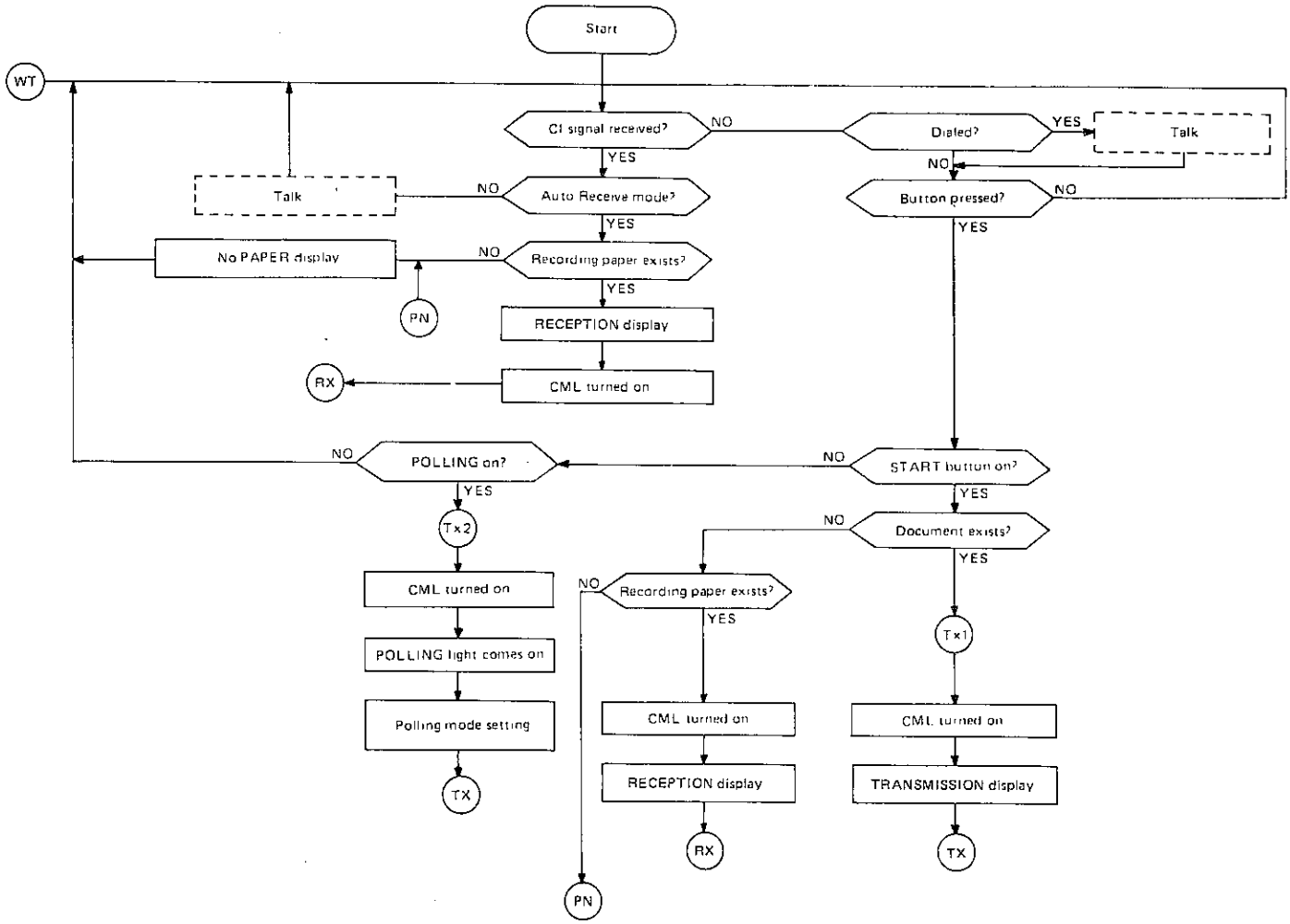


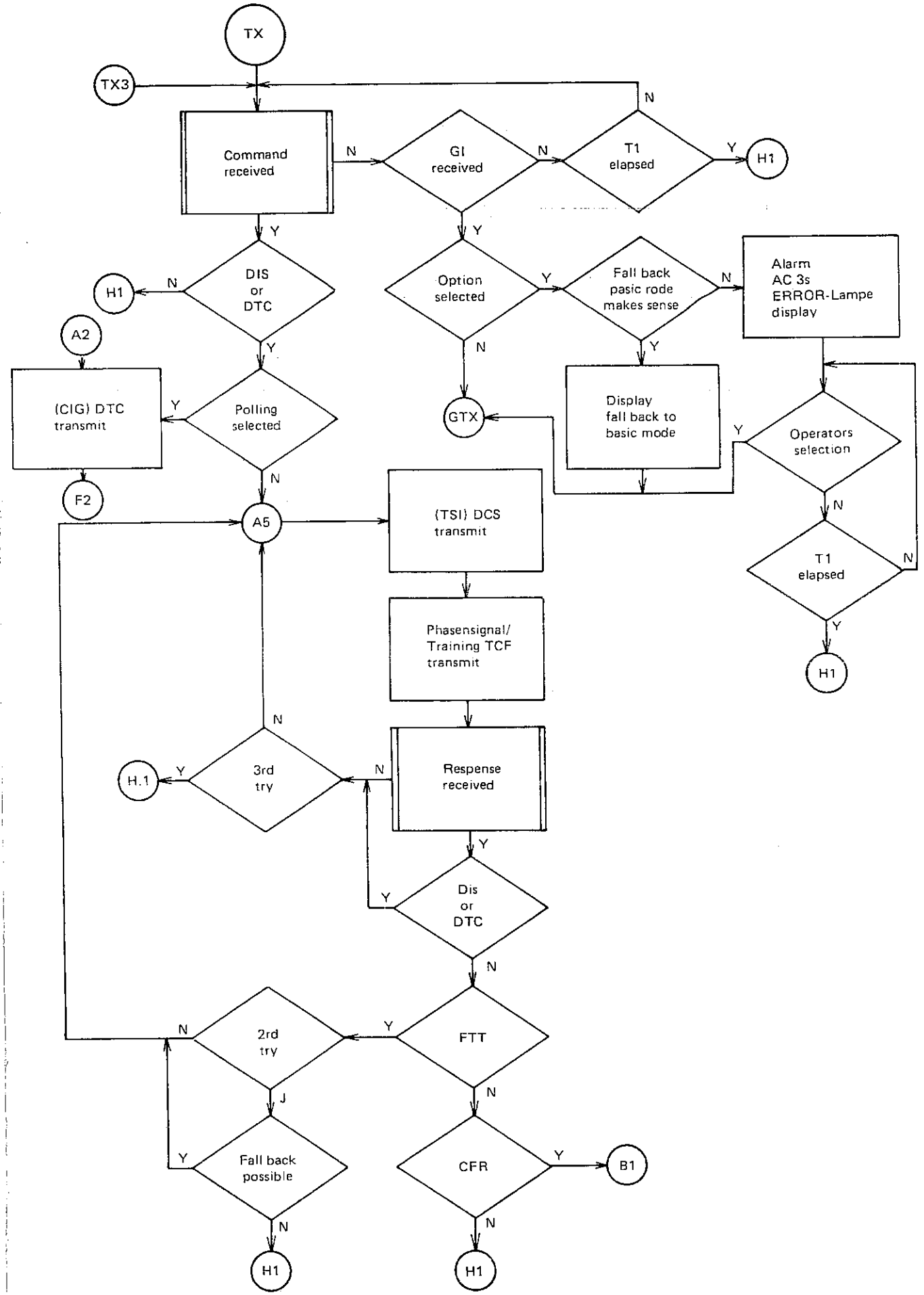

POWER P.W.B(2)

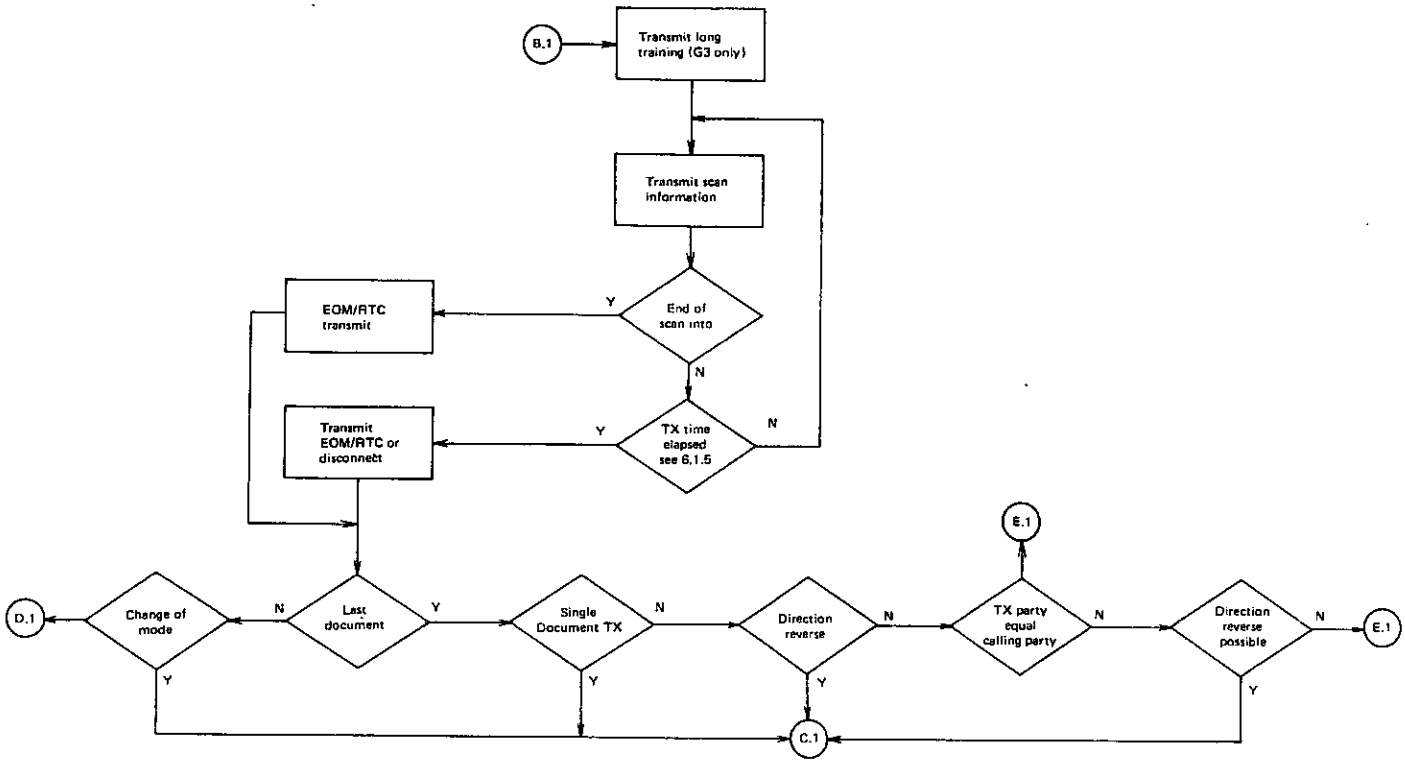


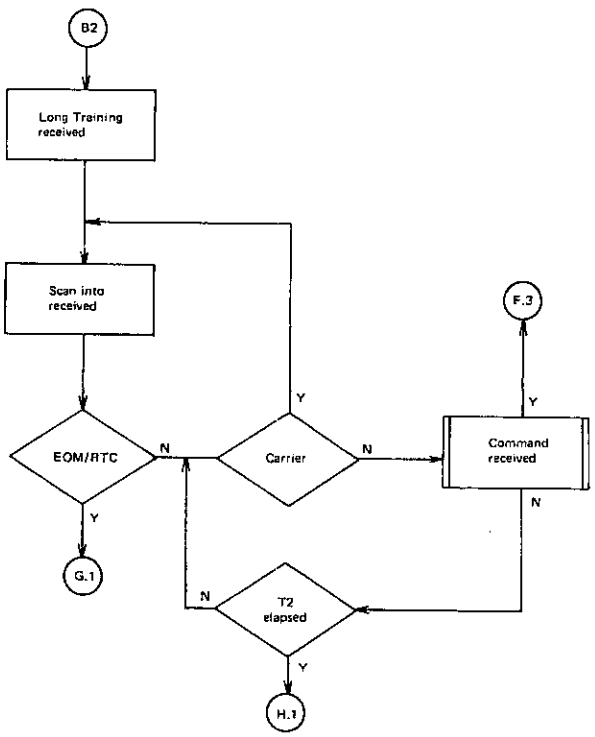
# Chapter 7. OPERATIONAL FLOWCHARTS

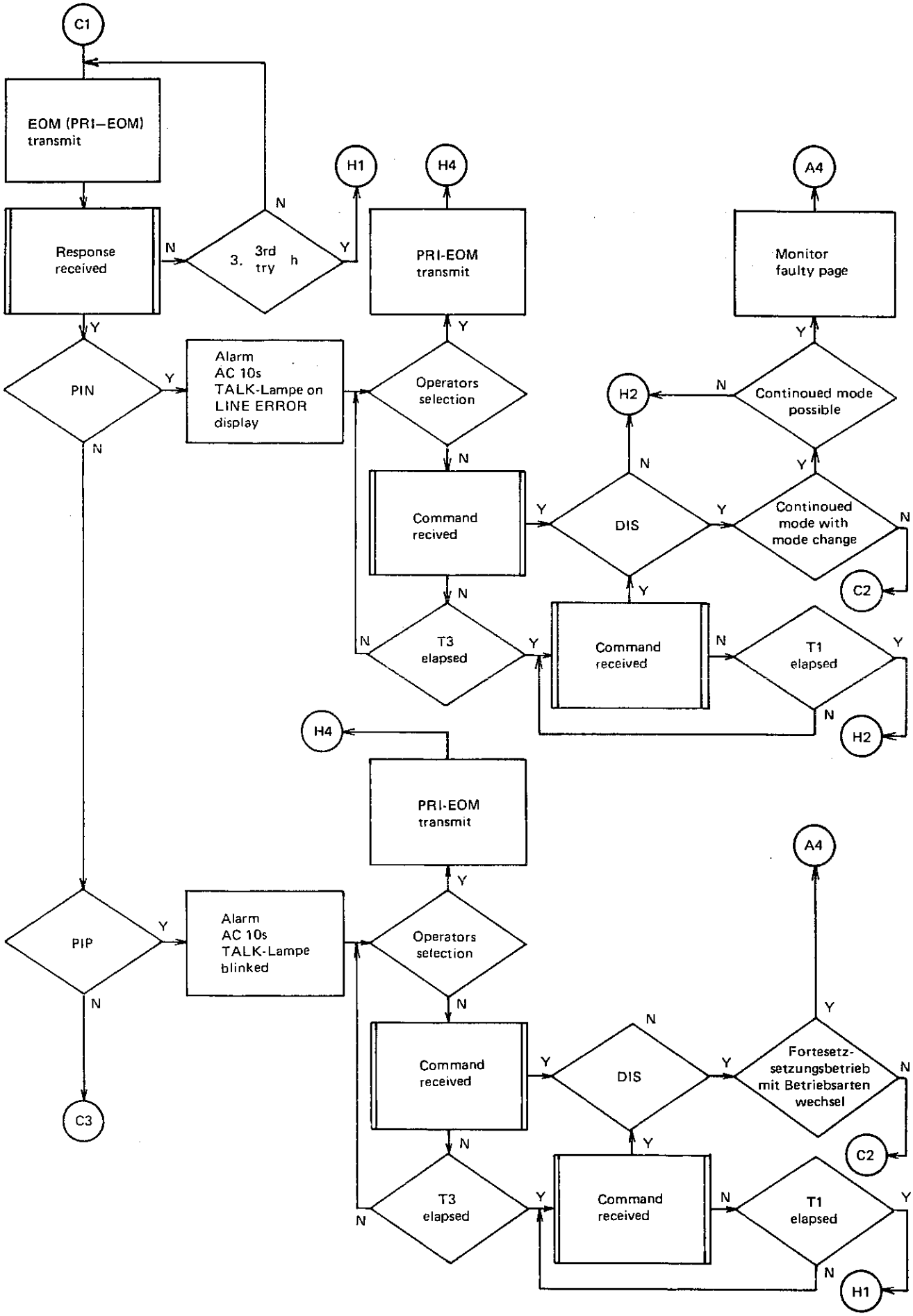
## [1] FLOWCHART

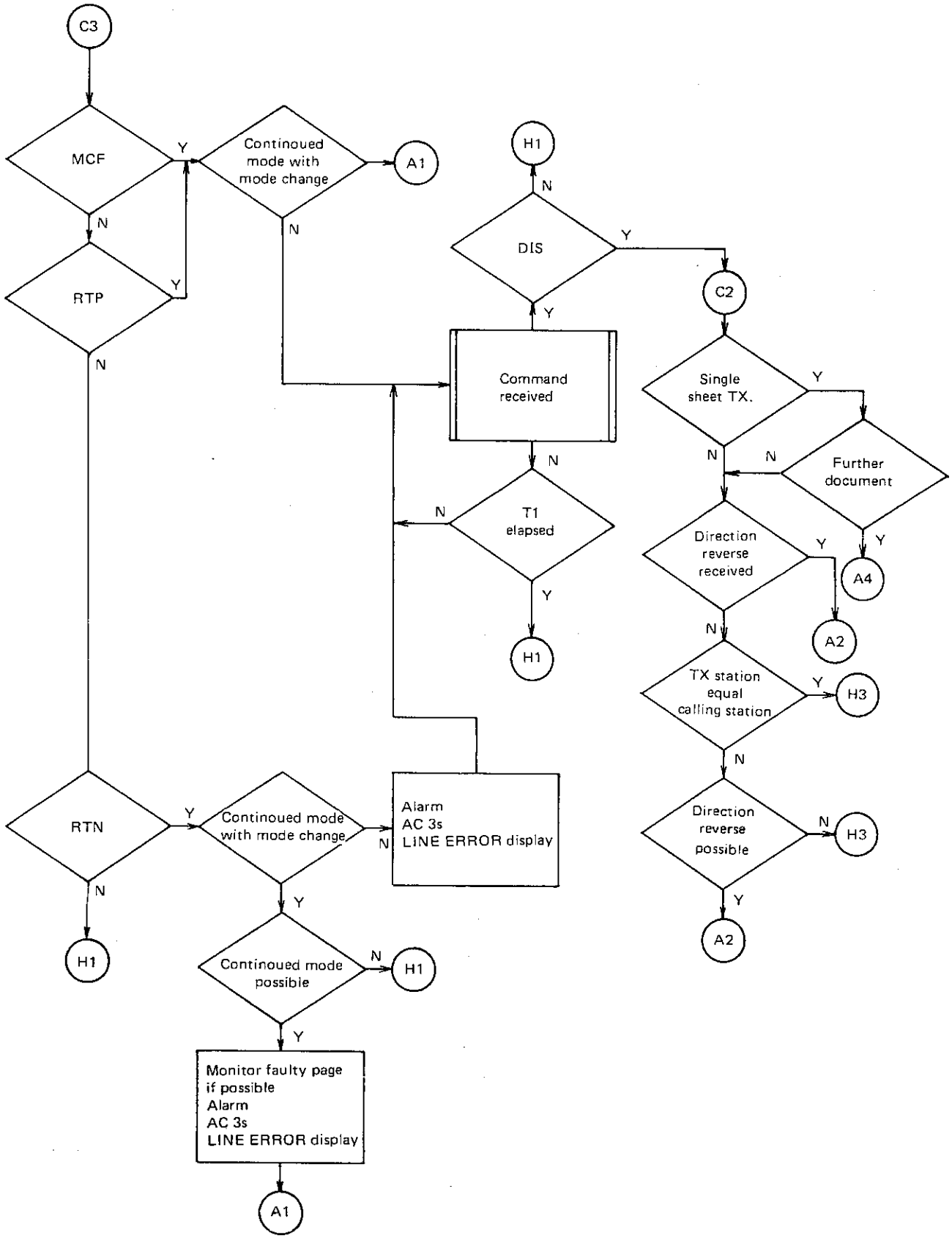


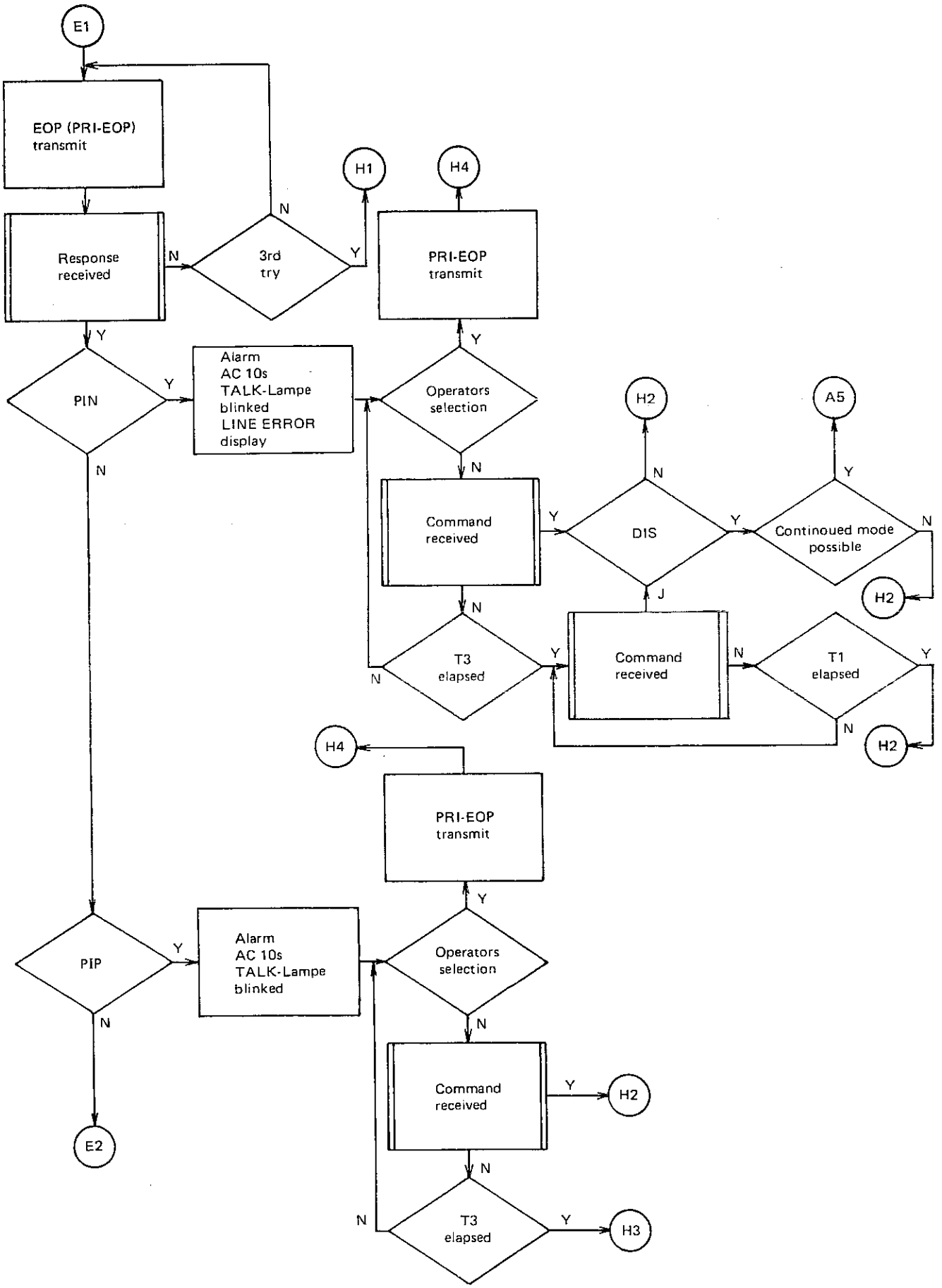

TX
TX3
Command received
N
GI received
N
T1 elapsed
Y
H1
Y
DIS or DTC
N
H1
Y
Option selected
Y
Fall back pasic rode makes sense
N
Alarm AC 3s ERROR-Lampe display
A2
(CIG) DTC transmit
Y
Polling selected
N
GTX
Display fall back to basic mode
Y
Operators selection
N
T1 elapsed
N
Y
H1
F2
A5
(TSI) DCS transmit
Phasensignal/ Training TCF transmit
Respense received
N
3rd try
Y
H.1
N
Y
Dis or DTC
Y
N
FTT
Y
2rd try
N
J
Fall back possible
Y
N
H1
CFR
Y
B1
N
H1

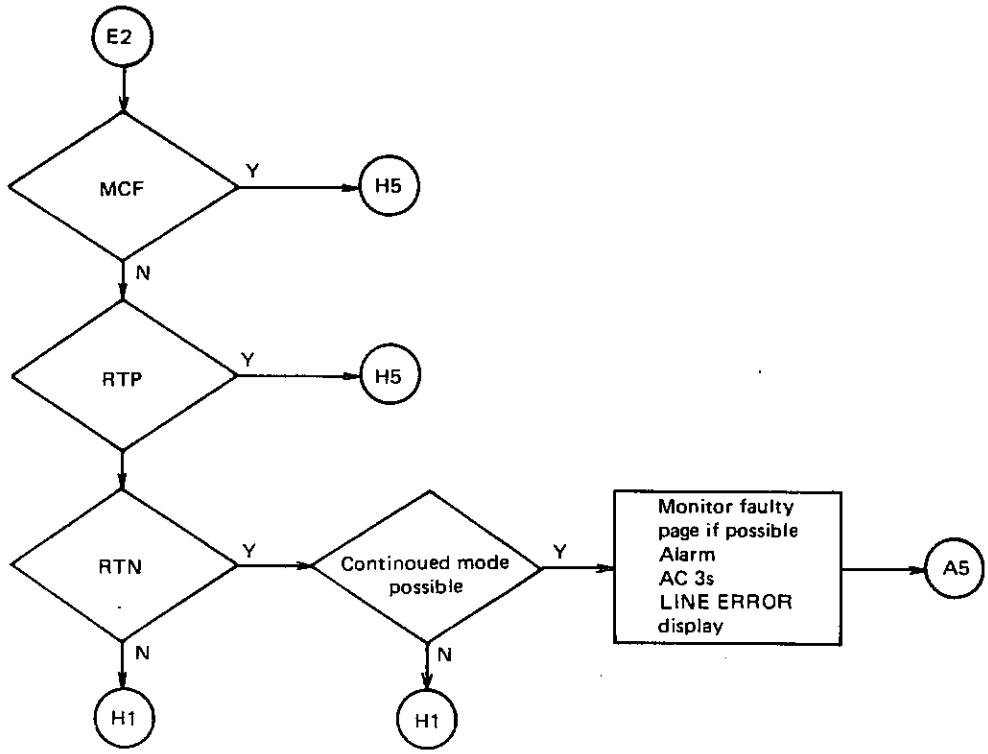

B.1
Transmit long training (G3 only)
Transmit scan information
End of scan into
Y
N
EOM/RTC transmit
TX time elapsed see 6.1.5
Y
N
Transmit EOM/RTC or disconnect
E.1
D.1
Change of mode
N
Last document
Y
Single Document TX
N
Direction reverse
N
TX party equal calling party
N
Direction reverse possible
N
E.1
Y
Y
Y
Y
C.1

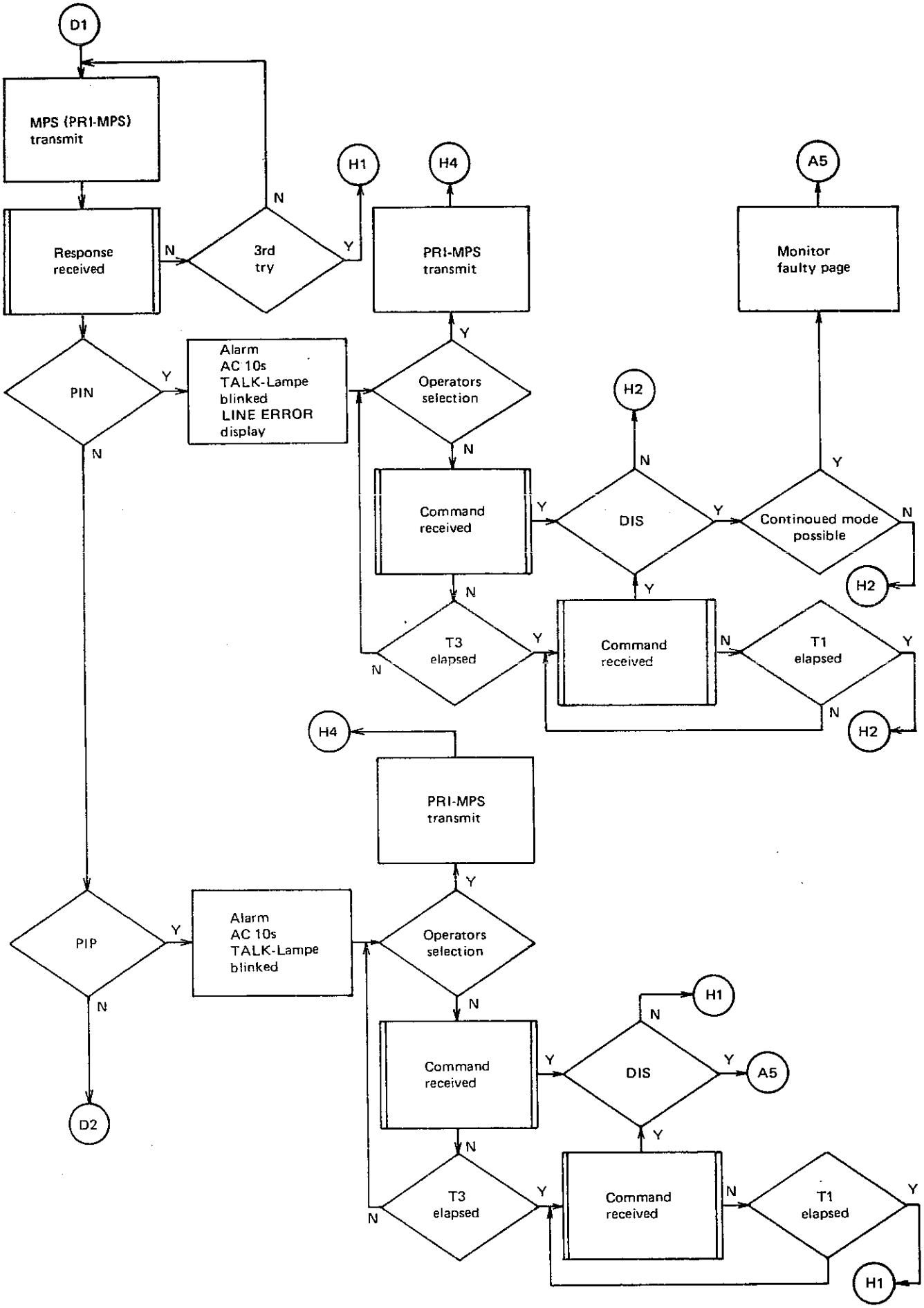

B2
Long Training received
Scan into received
F.3
Y
EOM/RTC
N
Carrier
N
Command received
Y
N
Y
G.1
N
T2 elapsed
Y
H.1

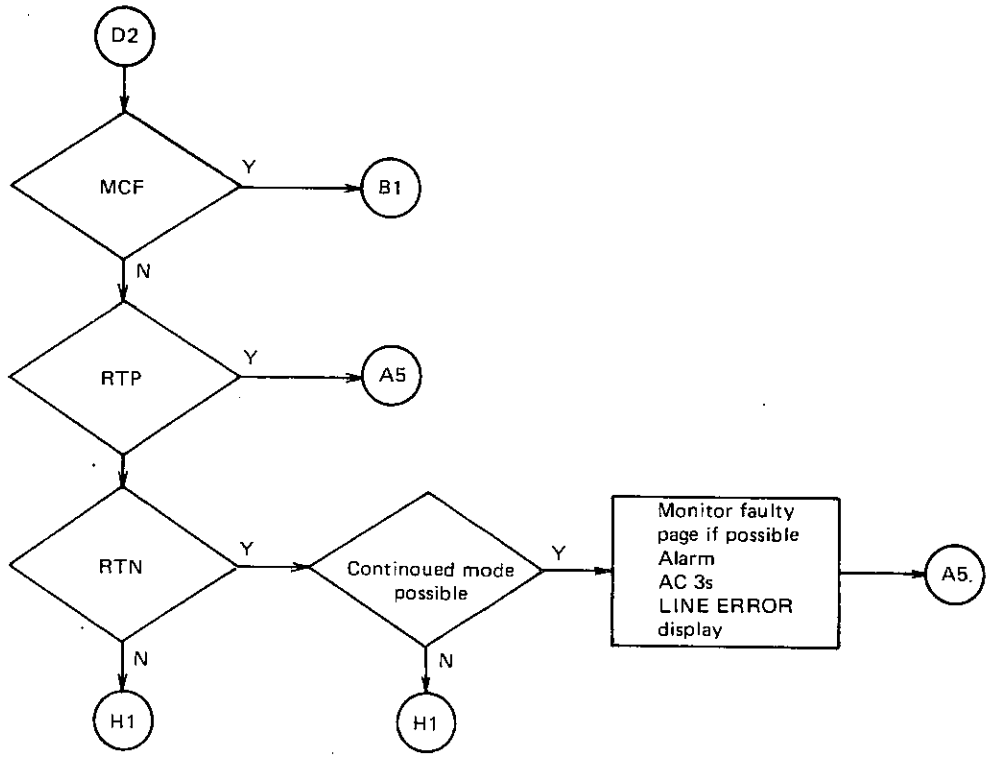

C1
EOM (PRI–EOM) transmit
Response received
N
3. 3rd try h
Y
N
H1
H4
PRI-EOM transmit
A4
Monitor faulty page
Y
PIN
Y
Alarm AC 10s TALK-Lampe on LINE ERROR display
Operators selection
Y
H2
N
Continoued mode possible
Y
N
Command recived
Y
DIS
Y
Continoued mode with mode change
N
C2
N
Y
N
T3 elapsed
N
Y
Command received
N
T1 elapsed
Y
N
H2
H4
PRI-EOM transmit
A4
Y
PIP
Y
Alarm AC 10s TALK-Lampe blinked
Operators selection
Y
N
Command received
Y
DIS
N
Y
Fortesetz-setzungsbetrieb mit Betriebsarten wechsel
N
C2
N
Y
N
T3 elapsed
Y
N
Command received
N
T1 elapsed
Y
N
H1
N
C3

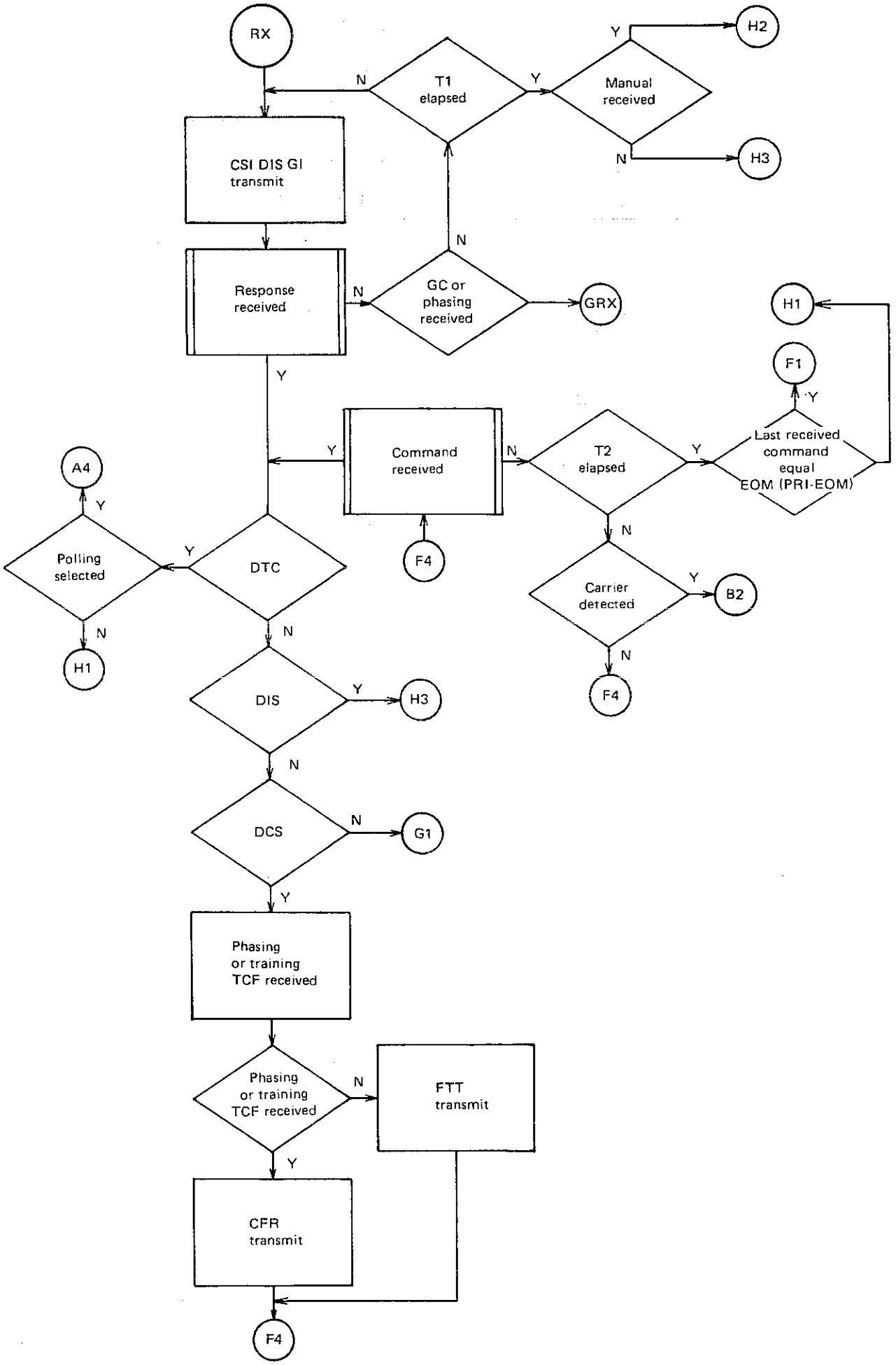

C3
MCF
Y
N
Continoued mode with mode change
A1
RTP
Y
N
H1
N
DIS
Y
C2
Y
Command received
N
T1 elapsed
N
Y
H1
Single sheet TX.
Y
N
N
Further document
Y
Direction reverse received
Y
A4
N
A2
TX station equal calling station
Y
H3
N
Direction reverse possible
N
H3
Y
A2
RTN
Y
N
H1
Continoued mode with mode change
N
Alarm
AC 3s
LINE ERROR display
Y
Continoued mode possible
N
H1
Y
Monitor faulty page if possible
Alarm
AC 3s
LINE ERROR display
A1

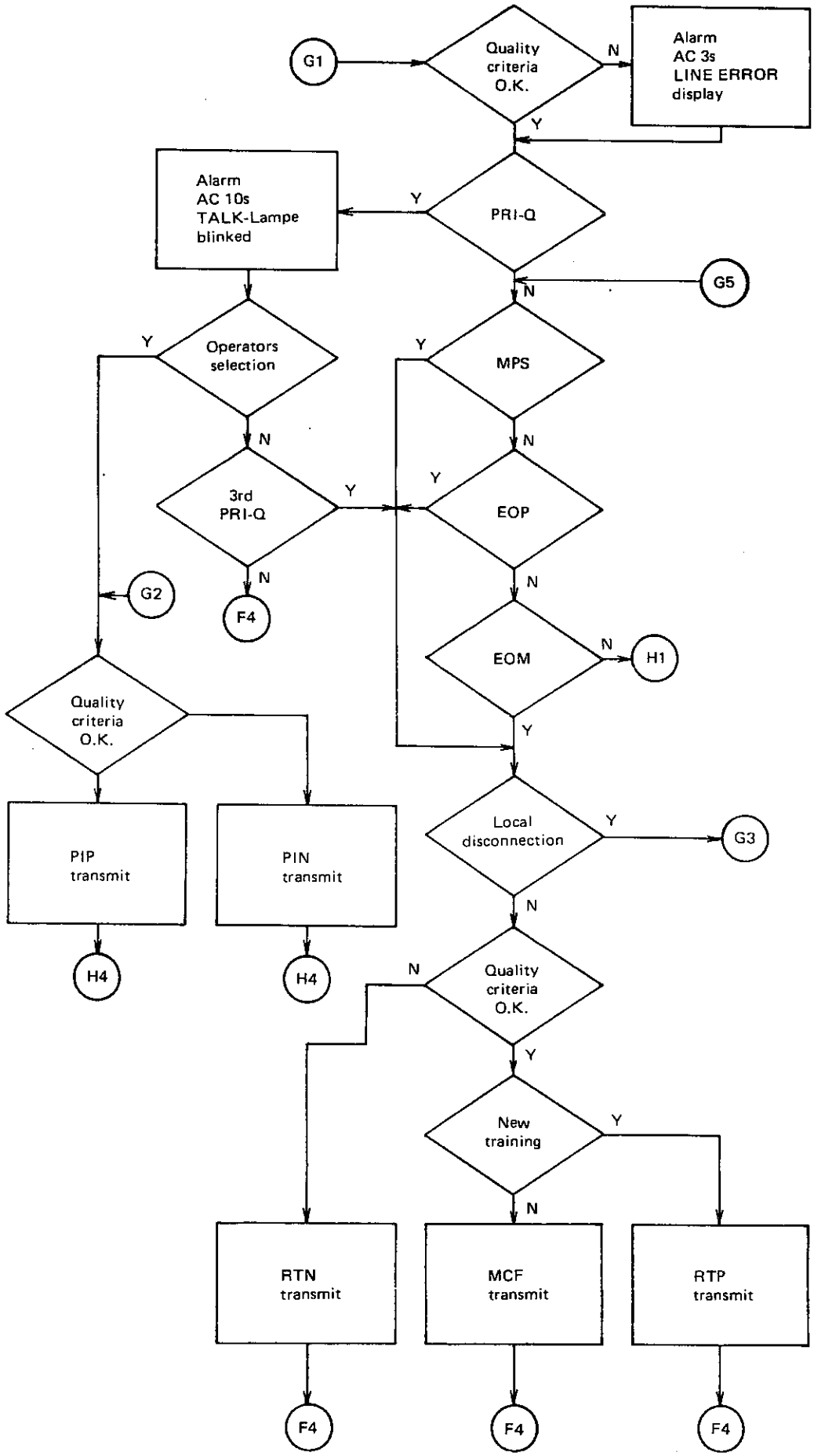

E1
EOP (PRI-EOP) transmit
Response received
N
3rd try
Y
N
H1
H4
PRI-EOP transmit
Y
PIN
Y
Alarm AC 10s TALK-Lampe blinked LINE ERROR display
Operators selection
N
H2
A5
N
Y
Command received
Y
DIS
Y
Continoued mode possible
N
H2
J
N
T3 elapsed
Y
N
Command received
N
T1 elapsed
Y
N
H2
H4
PRI-EOP transmit
Y
PIP
Y
Alarm AC 10s TALK-Lampe blinked
Operators selection
N
N
Command received
Y
H2
N
T3 elapsed
Y
H3
N
E2

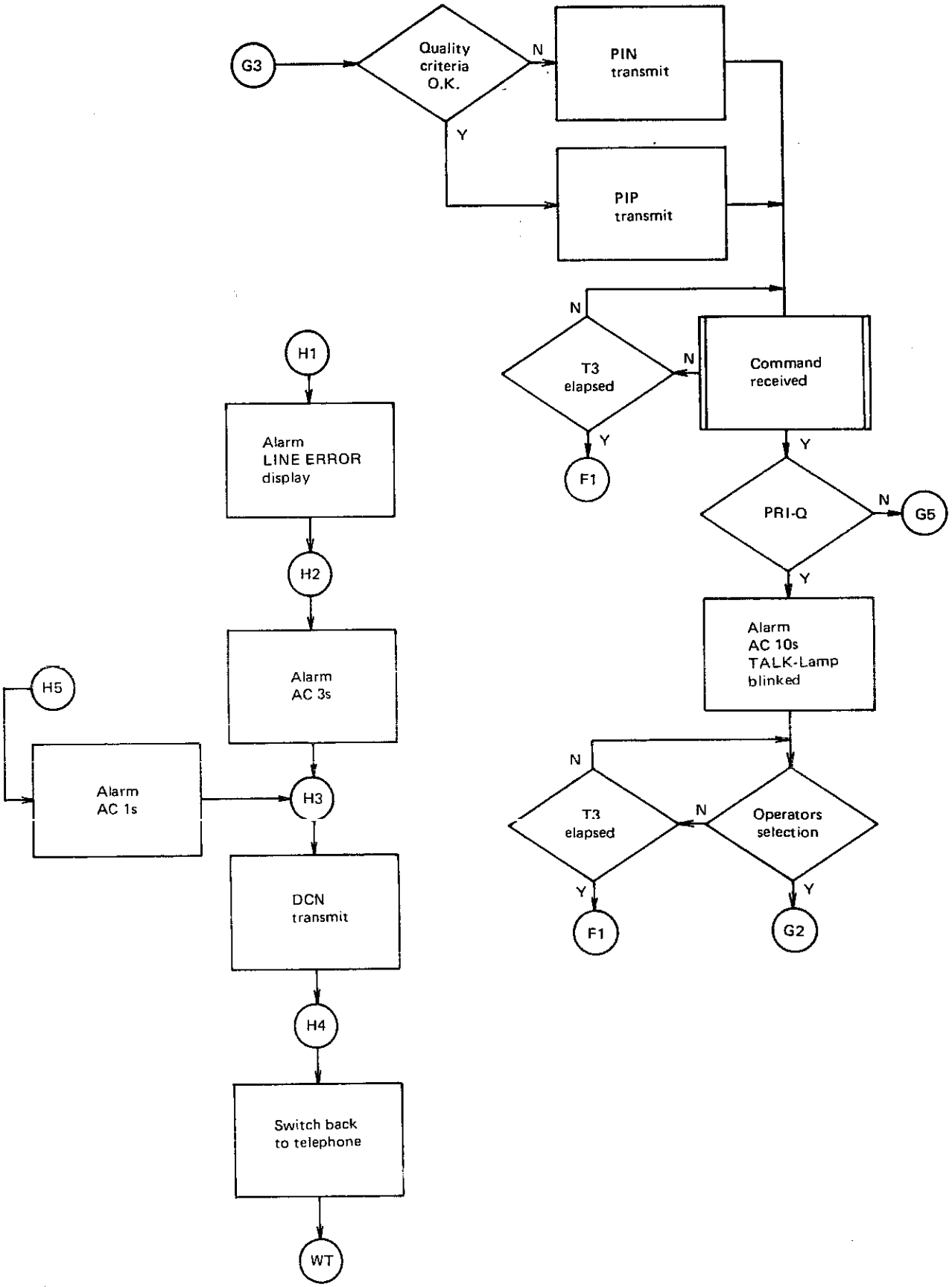

E2
MCF
Y
H5
N
RTP
Y
H5
RTN
Y
Continoued mode possible
Y
Monitor faulty page if possible
Alarm
AC 3s
LINE ERROR display
A5
N
H1
N
H1

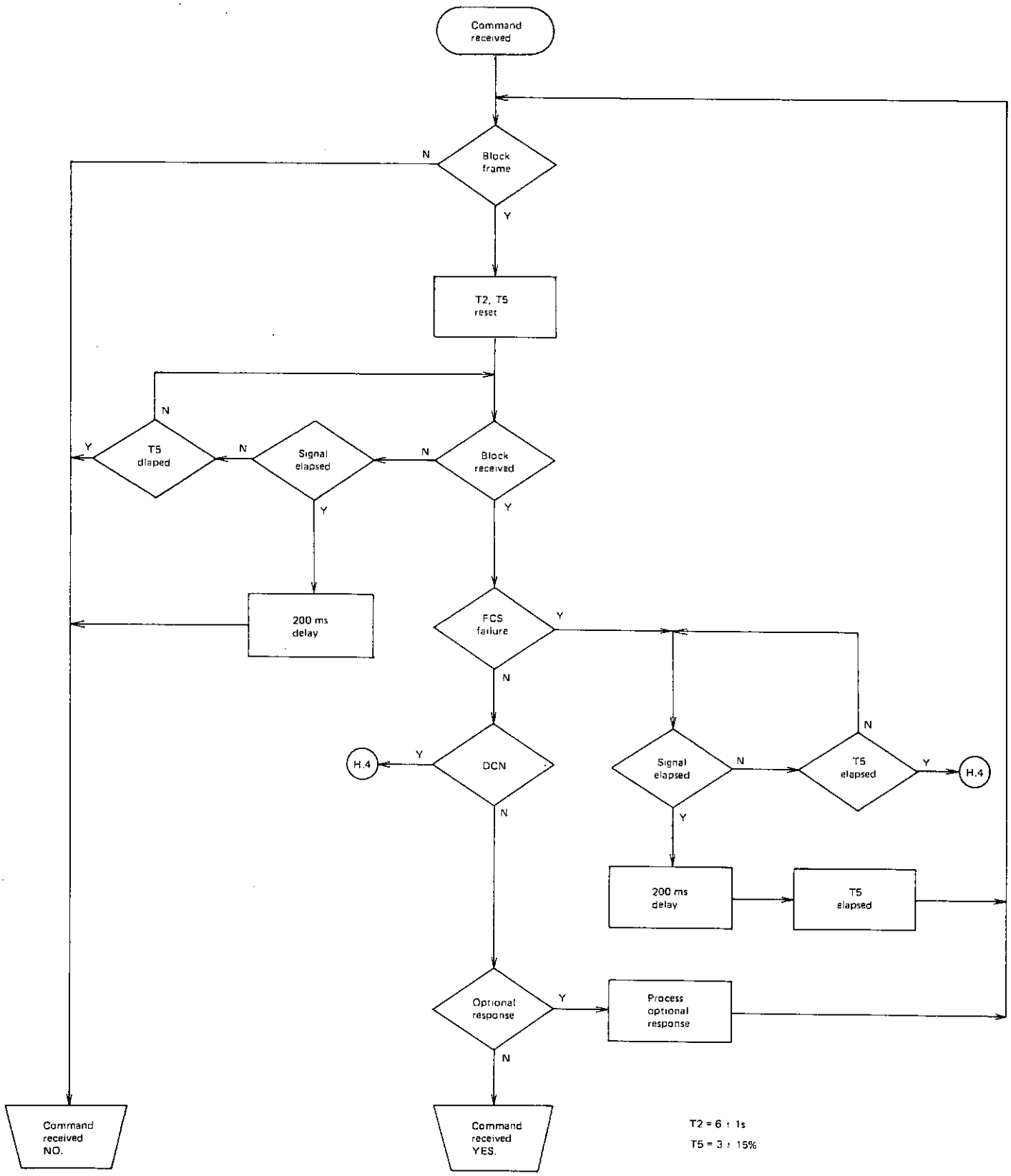

D1
MPS (PRI-MPS) transmit
Response received
N
3rd try
Y
N
H1
H4
PRI-MPS transmit
A5
Monitor faulty page
PIN
Y
N
Alarm AC 10s TALK-Lampe blinked LINE ERROR display
Operators selection
Y
N
H2
Command received
Y
DIS
Y
N
Continoued mode possible
Y
N
H2
T3 elapsed
Y
N
Command received
N
T1 elapsed
Y
N
H2
H4
PRI-MPS transmit
Y
PIP
Y
N
Alarm AC 10s TALK-Lampe blinked
Operators selection
N
H1
N
Command received
Y
DIS
Y
A5
Y
N
T3 elapsed
Y
N
Command received
N
T1 elapsed
Y
H1
D2

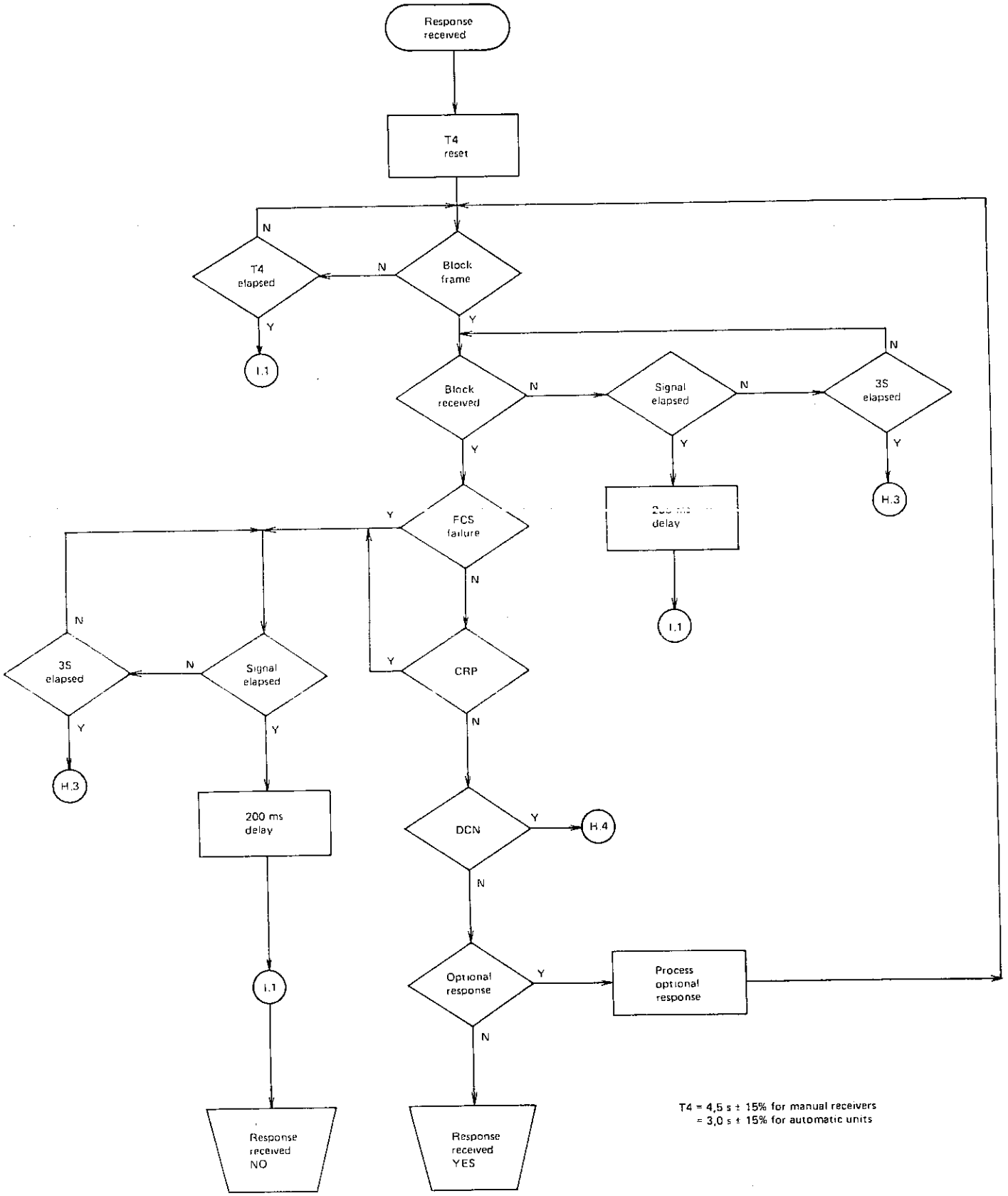

D2
MCF
Y
B1
N
RTP
Y
A5
RTN
Y
Continoued mode possible
Y
Monitor faulty page if possible
Alarm
AC 3s
LINE ERROR display
A5.
N
H1
N
H1


RX
T1 elapsed
N
Y
Manual received
Y
H2
N
H3
CSI DIS GI transmit
N
Response received
N
GC or phasing received
GRX
Y
H1
F1
Y
Last received command equal EOM (PRI-EOM)
Y
Command received
N
T2 elapsed
Y
A4
Y
Polling selected
Y
DTC
F4
N
Carrier detected
Y
B2
N
N
H1
N
F4
DIS
Y
H3
N
DCS
N
G1
Y
Phasing or training TCF received
Phasing or training TCF received
N
FTT transmit
Y
CFR transmit
F4


G1
Quality criteria O.K.
N
Alarm AC 3s LINE ERROR display
Y
PRI-Q
Y
Alarm AC 10s TALK-Lampe blinked
G5
N
Operators selection
Y
MPS
Y
N
N
3rd PRI-Q
Y
EOP
N
N
G2
F4
EOM
N
H1
Quality criteria O.K.
Y
Local disconnection
Y
G3
PIP transmit
PIN transmit
N
H4
H4
N
Quality criteria O.K.
Y
New training
Y
N
RTN transmit
MCF transmit
RTP transmit
F4
F4
F4

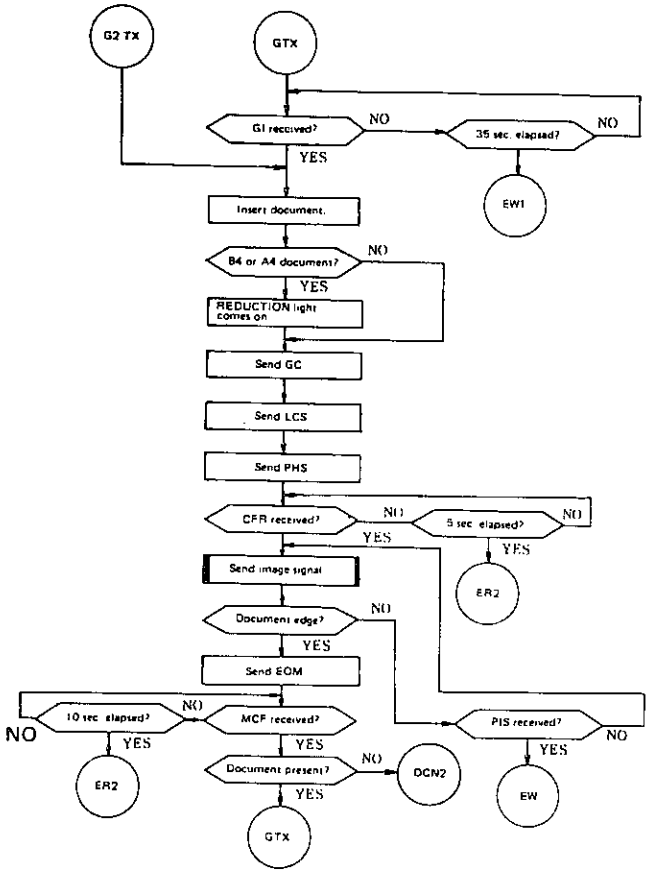

G3
Quality criteria O.K.
N
Y
PIN transmit
PIP transmit
N
T3 elapsed
N
Command received
Y
F1
Y
PRI-Q
N
G5
Y
Alarm AC 10s TALK-Lamp blinked
N
T3 elapsed
N
Operators selection
Y
F1
Y
G2
H1
Alarm LINE ERROR display
H2
Alarm AC 3s
H5
Alarm AC 1s
H3
DCN transmit
H4
Switch back to telephone
WT


Command received
Block frame
N
Y
T2, T5 reset
N
T5 dlaped
Y
N
Signal elapsed
N
Block received
Y
Y
200 ms delay
FCS failure
Y
N
H.4
Y
DCN
N
Signal elapsed
N
T5 elapsed
Y
H.4
Y
200 ms delay
T5 elapsed
Optional response
Y
Process optional response
N
Command received NO.
Command received YES.
T2 = 6 ± 1s
T5 = 3 ± 15%

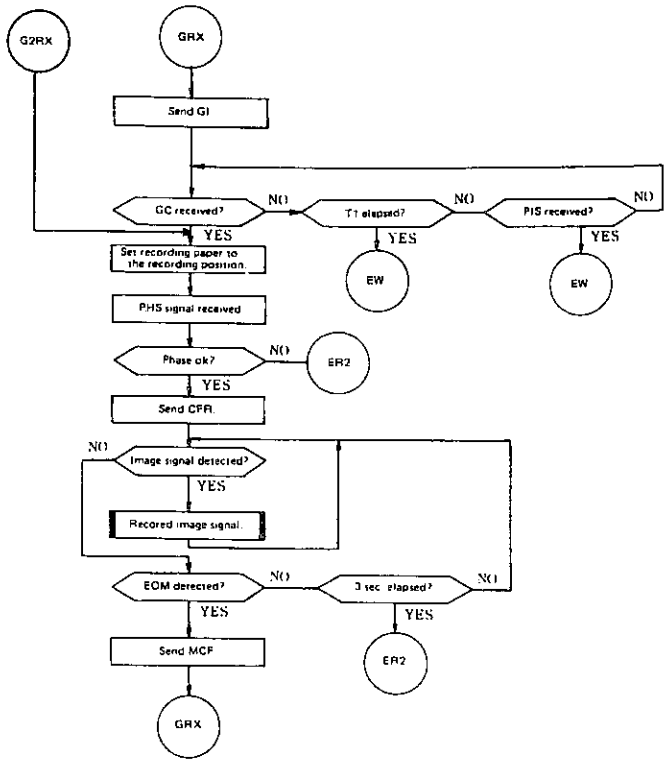


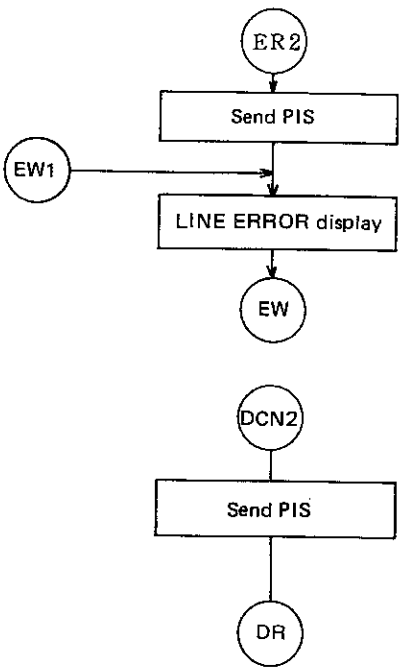

T4 = 4,5 s ± 15% for manual receivers
= 3,0 s ± 15% for automatic units

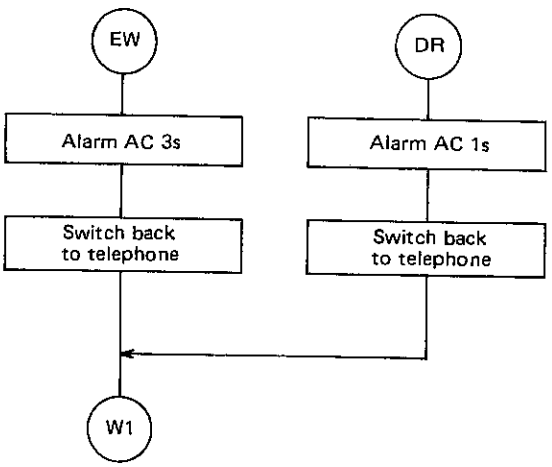
## GII Transmission Routine




## GII Reception Routine

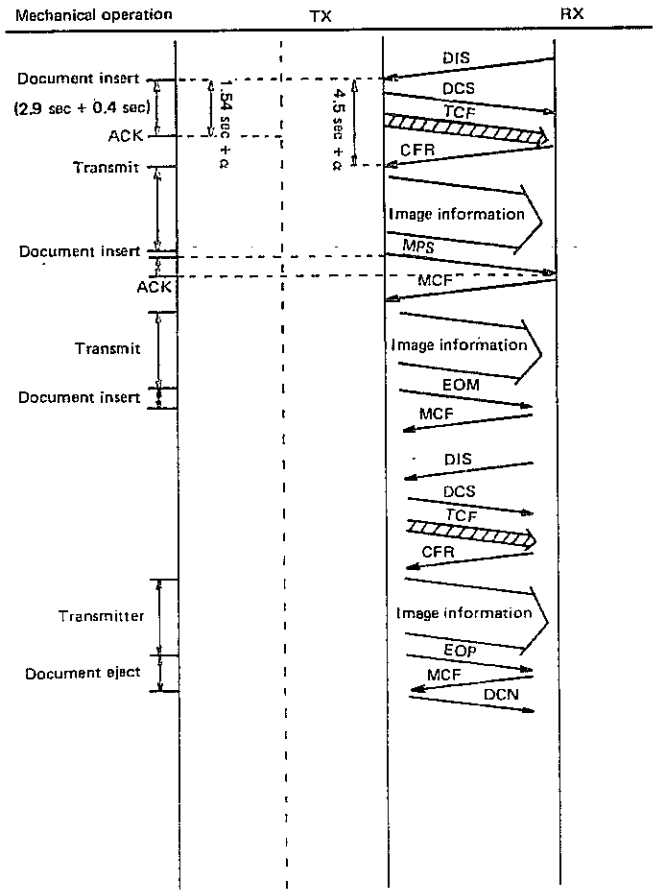


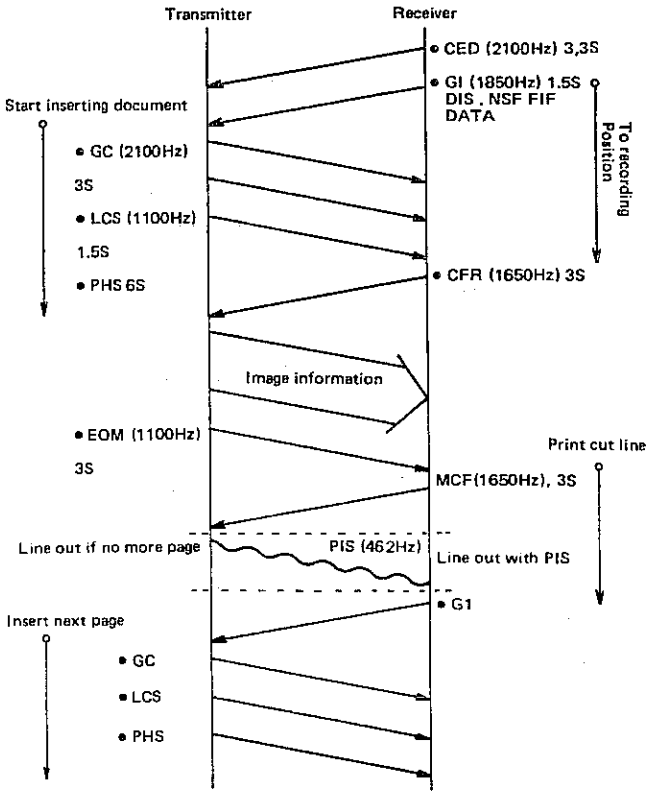



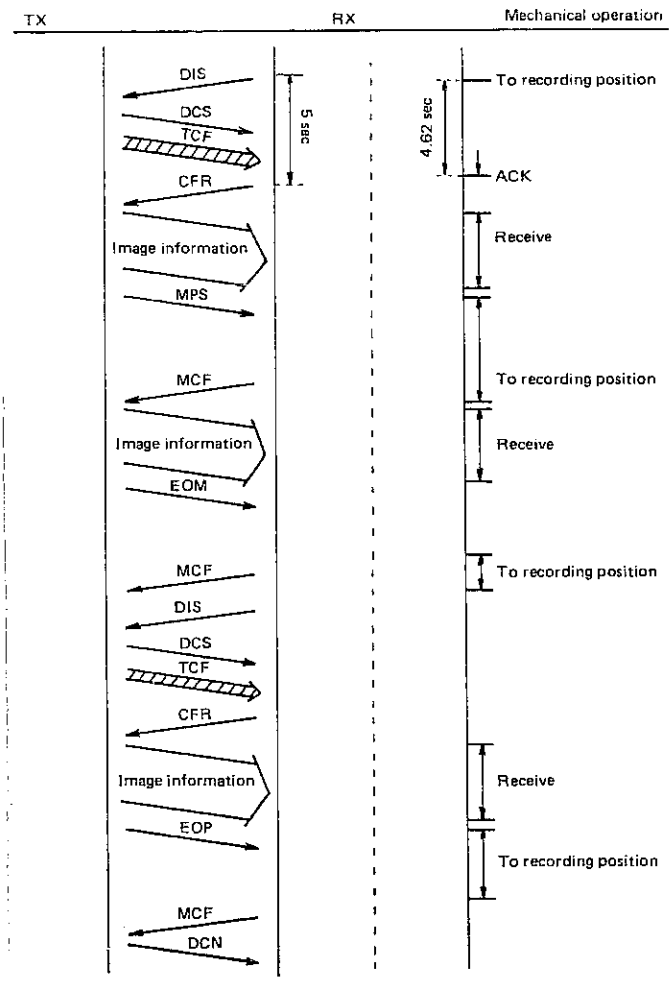
## [2] PROTOCOL

High speed procedure

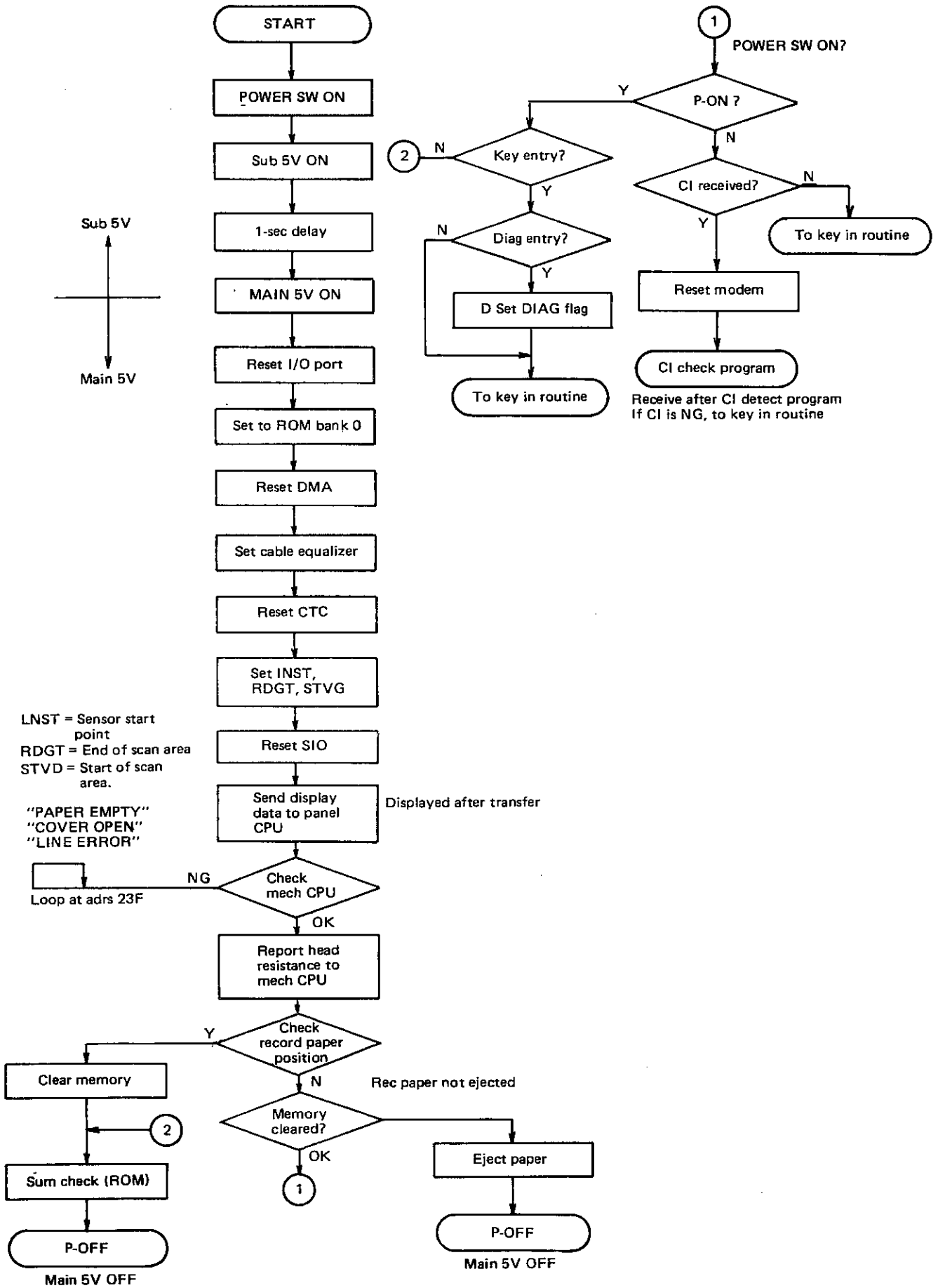



G2 procedure



## [3] POWER ON SEQUENCE



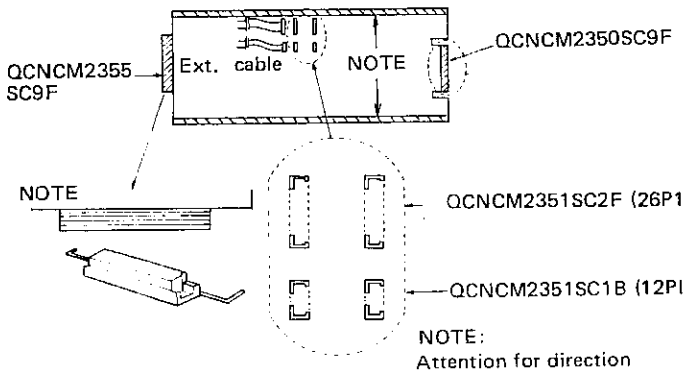
# Chapter 8 Servcice tools

## [1] SERVICE TOOLS

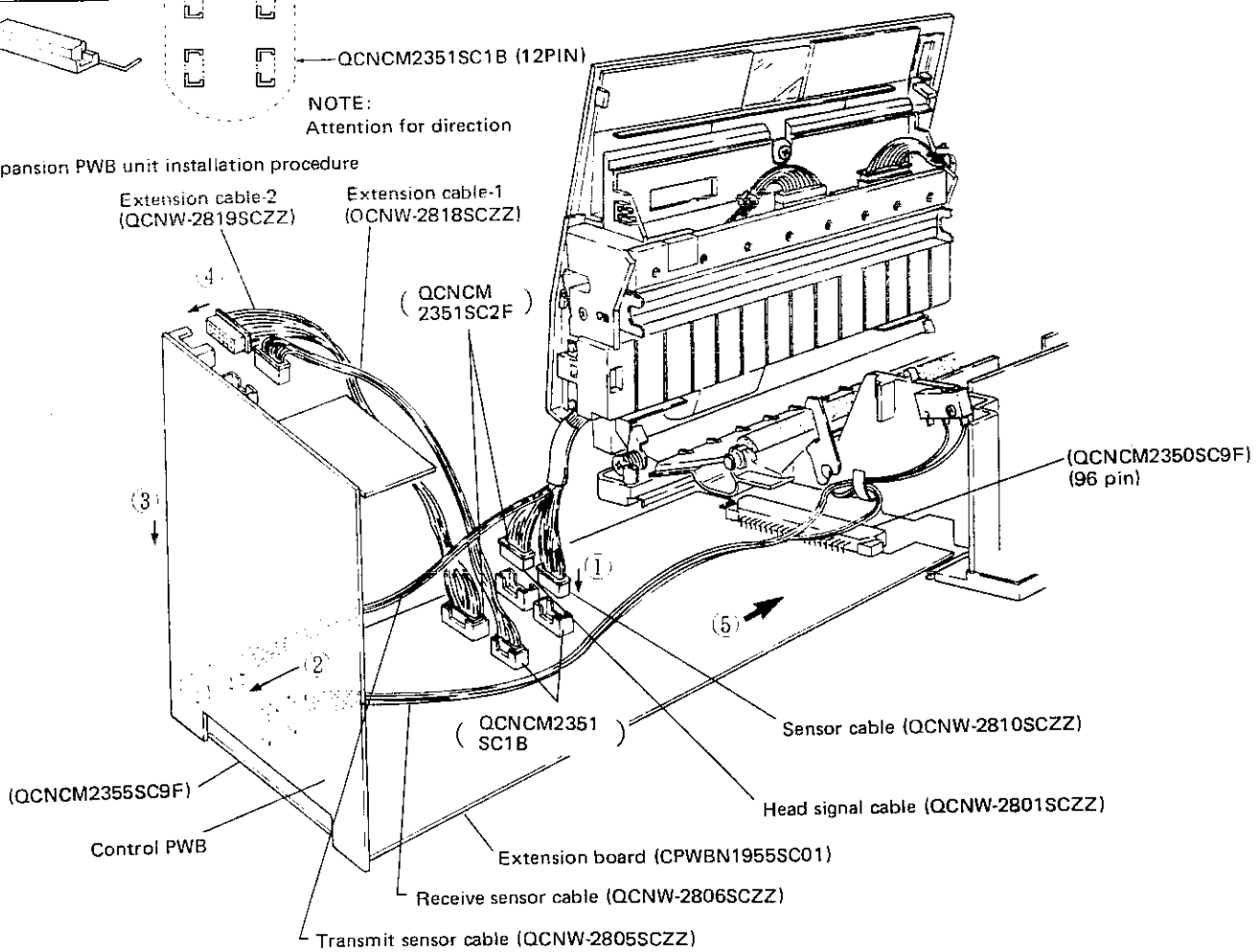
### 1. Extension PWB unit

| No. | Parts code | Description | Qty | Price rank |
|---|---|---|---|---|
| 1 | QPWBN1955SCZZ | Board expansion board | 1 | BU |
| 2 | QCNCM2350SC9F | ME03-96P-M4LT-A1 | 1 | AR |
| 3 | QCNCW2355SC9F | ME03-96S-M4T2-A1 | 1 | AW |
| 4 | QCNCM2351SC1B | LX-12P-DT1-P1 | 2 | AG |
| 5 | QCNCM2351SC2F | LX-26P-DT1-P1 | 2 | AH |
| 6 | QCNW-2818SCZZ | Extension cable-1 | 1 | AR |
| 7 | QCNW02819SCZZ | Extension cable-2 | 1 | AW |
| | CPWBN1955SC01 | Extension board unit | | BZ |

(1) Expansion PWB unit assembly precautions




(2) Expansion PWB unit installation procedure




NOTE: When inserting the extension PWB unit, cover the PWB edges with a 0.39" (10mm) wide tape to prevent scratching the resist.

Procedure

(1) Insert the expansion PWB unit (CPWBN1955SC01). Do not insert all the way in, but insert the sensor cable (QCNW-2810SCZZ) and the head signal cable (QCNW-2801SCZZ) first.

(2) Insert onto the control PWB the transmission sensor cable (QCNW-2805SCZZ) and the receive sensor cable (QCNW-2806SCZZ).

(3) Insert the control PWB onto the extension board.

(4) Inseert onto the control PWB the extension cable-1 (QCNW-2818SCZZ) and the extension cable-2 (QCNW-2819SCZZ).

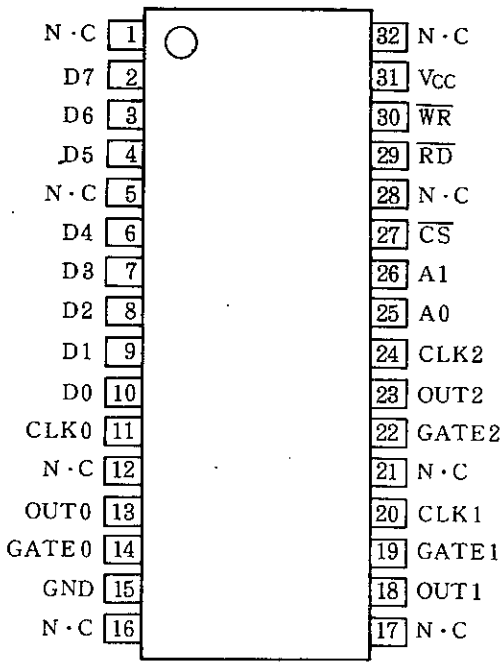
(5) Insert the nut all the way in so that the 96-p connector of the extension board may be fully inserted.

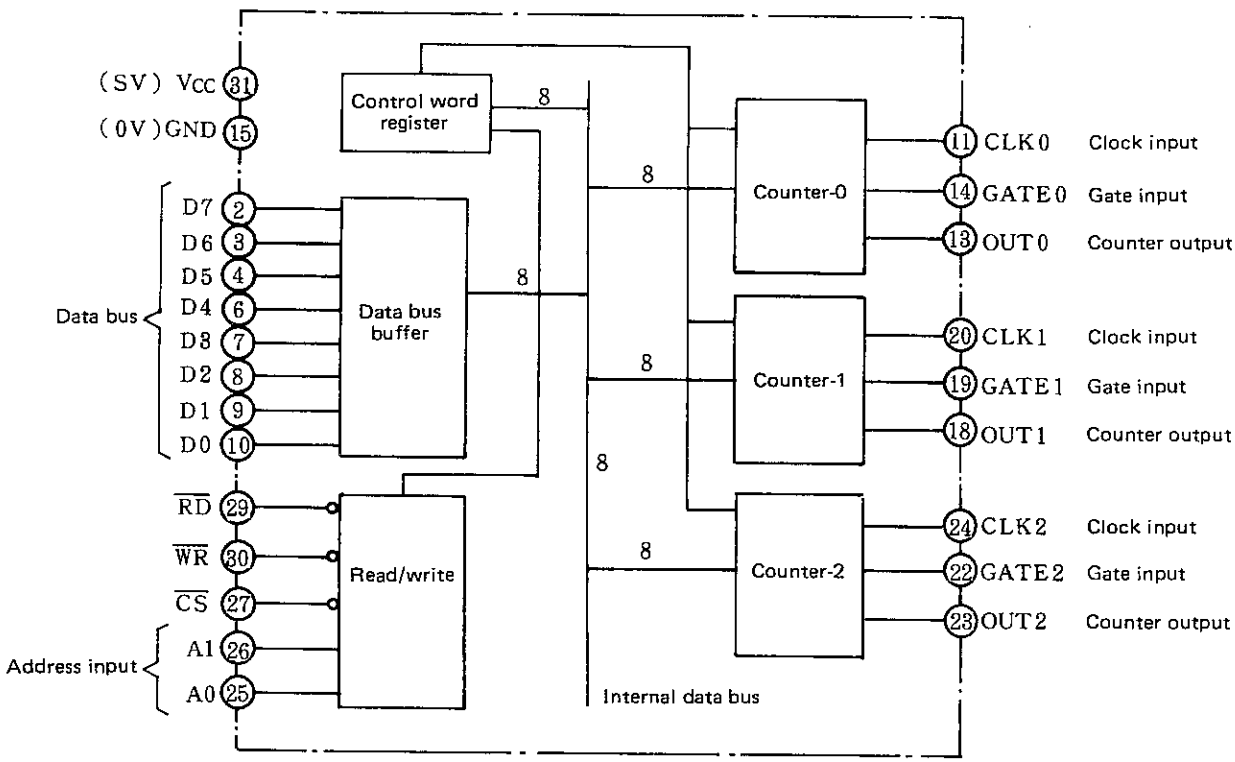
### 2. Modem extension PWB unit

| No. | Parts code | Description | Qty | Price rank |
|---|---|---|---|---|
| 1 | QPWBN1985SCZZ | Modem expansion board | 1 | BA |
| 2 | QCNW-2832SCZZ | Modem extension cable | 1 | AX |
| 3 | QCNCM2346SC1J | 10P | 1 | AE |
| 4 | QCNCM2502RC4J | 40P | 2 | AK |
| 5 | VHIM53217P/-1 | 7417 | 1 | AF |
| 6 | VHPGL31AR8/-1 | LED GL31AR8 | 2 | AD |
| 7 | VRD-ST2EY102J | 1K resister | 2 | AA |
| 8 | VCKYPU1HF223Z | 223C condensor | 9 | AA |
| | CPWBN1985SC01 | Modem extension PWB | | BB |

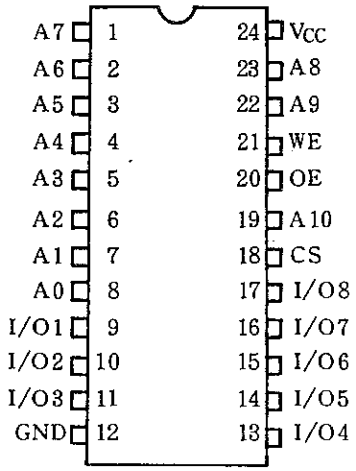
## [2] REFERENCE DATA

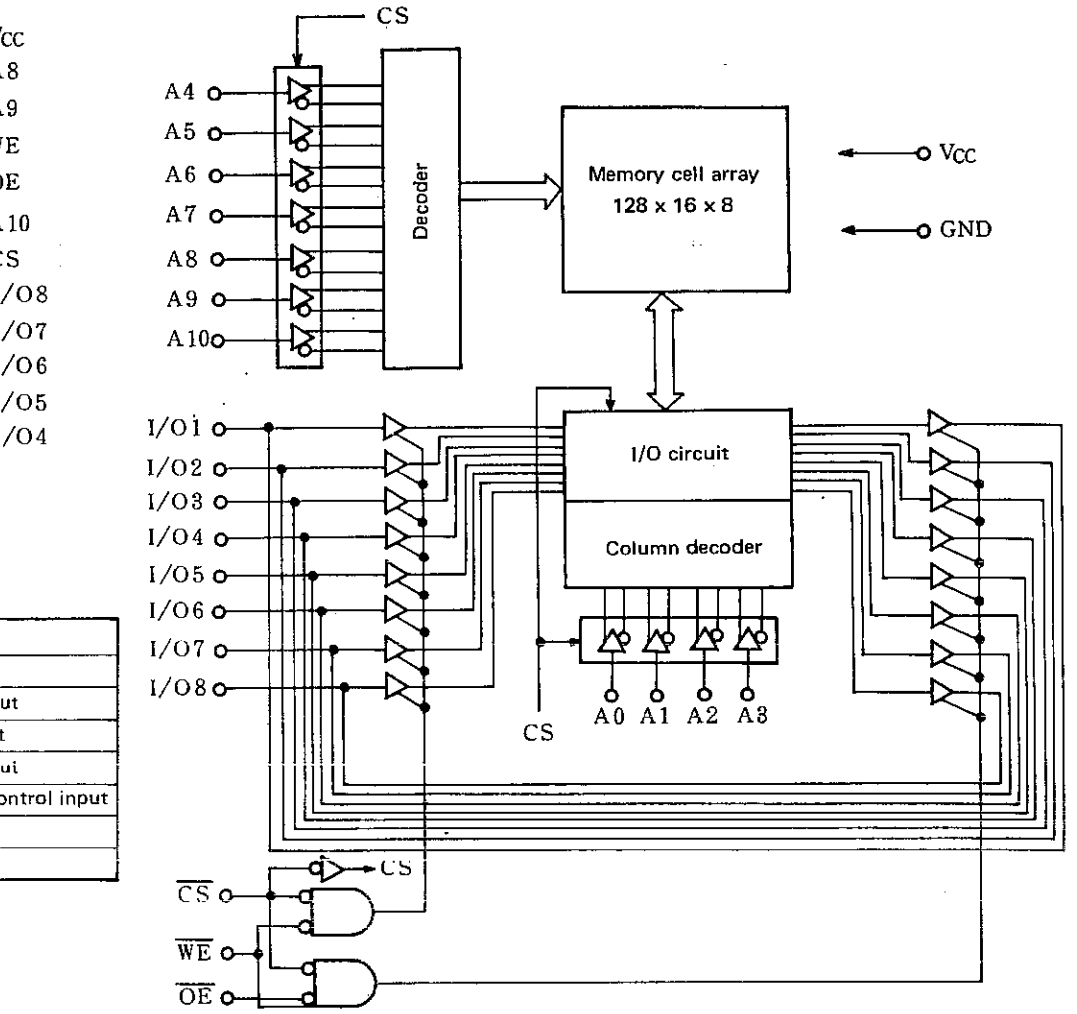
### VHIMS82C53GSV



## VHITTM2015AP1

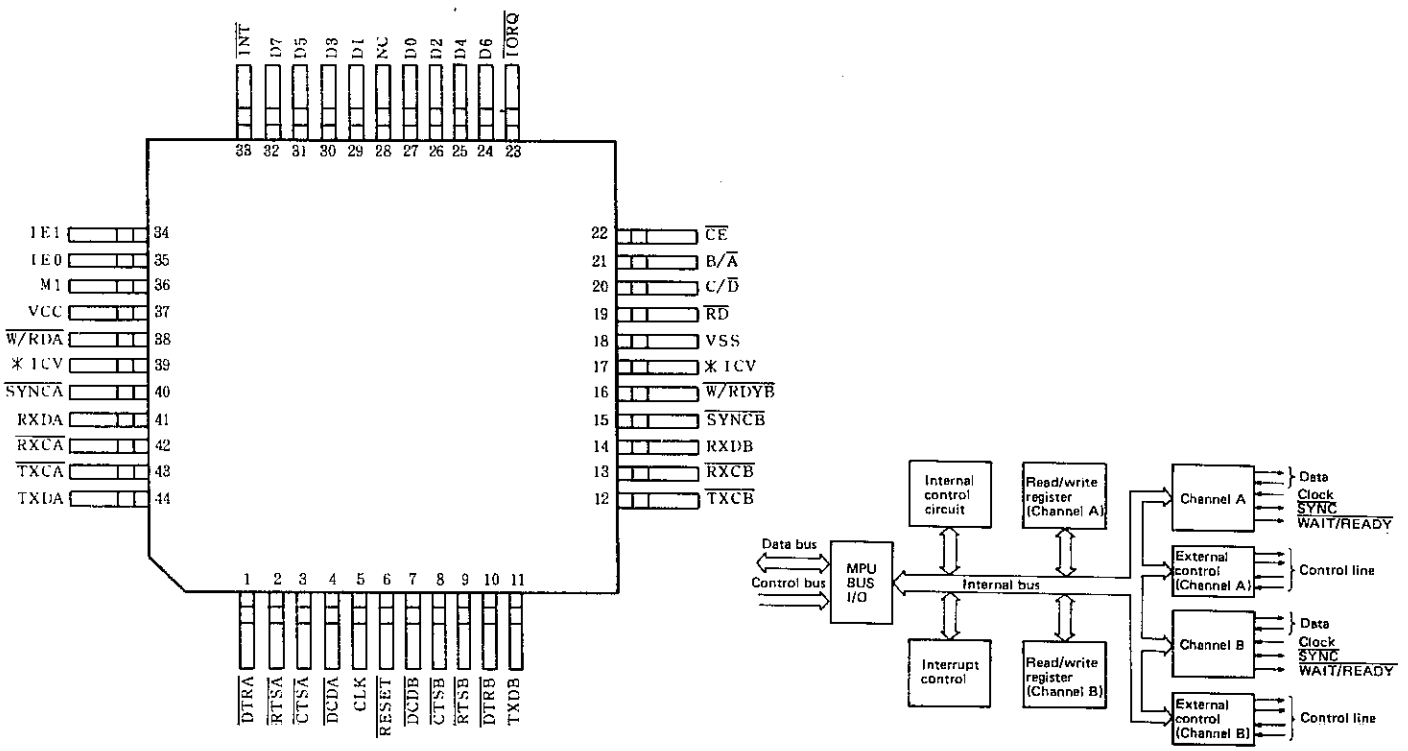


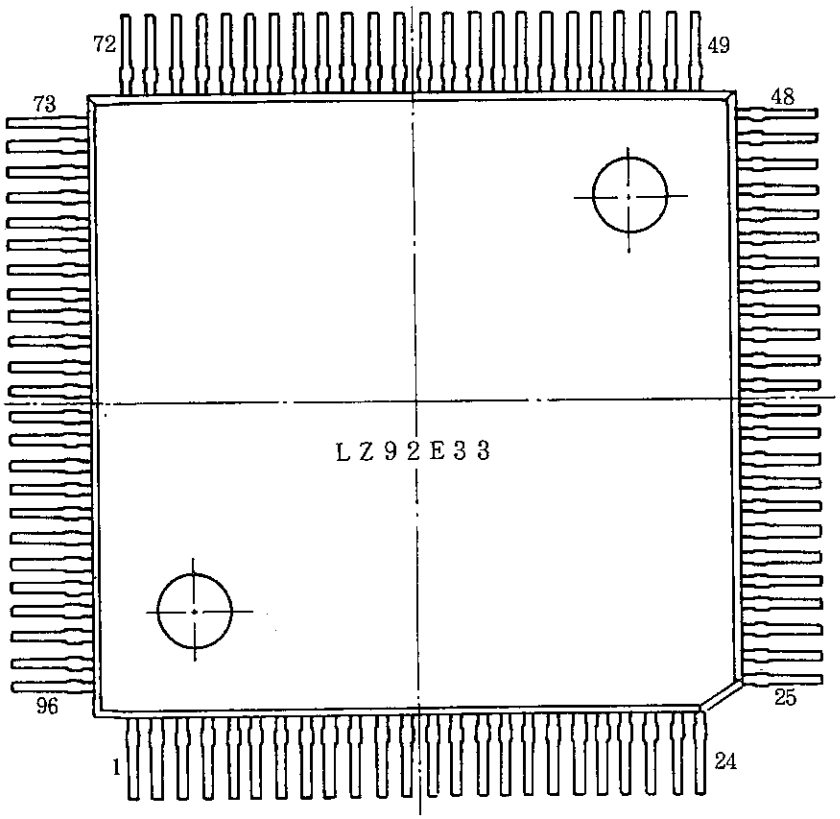

**Pin description**

| Symbol | Description |
|---|---|
| A0-A10 | Address input |
| I/01-I/08 | Data input/output |
| CS | Chip select input |
| WE | Write enable input |
| OE | Output buffer control input |
| VCC | 5V supply |
| GND | Ground |

## VHITMPZ84C43F



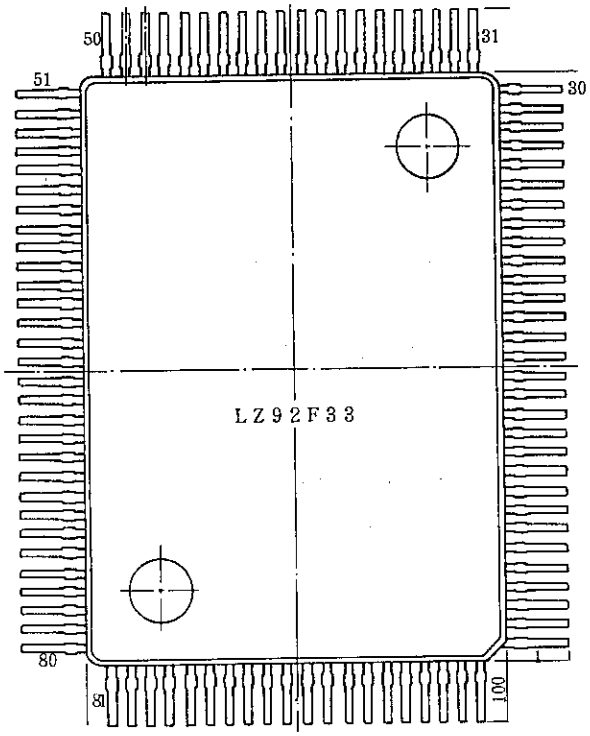
## VHILZ92E33/−1

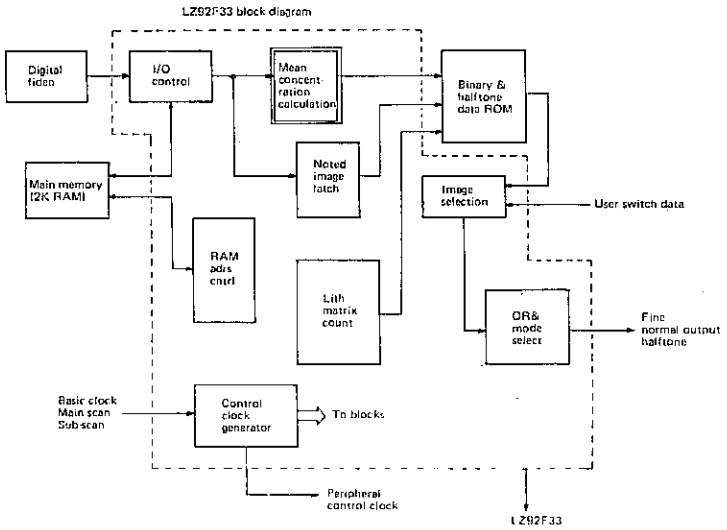



| PIN No. | I/O | Signal | PIN No. | I/O | Signal | PIN No. | I/O | Signal | PIN No. | I/O | Signal |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | N.C. | 25 | O | GQ8 | 49 | I | MPHS | 73 | I | AD1 |
| 2 | | N.C. | 26 | O | GQ9 | 50 | I | MPHC | 74 | I | AD2 |
| 3 | I | XTAL | 27 | O | GQ10 | 51 | I | MOUT | 75 | I | AD3 |
| 4 | O | $\overline{\text{RCP125}}$ | 28 | O | GQ11 | 52 | O | SYNCO | 76 | I | AD4 |
| 5 | O | $\overline{\text{CP25}}$ | 29 | I | ADJ | 53 | O | G2TXD | 77 | I | AD5 |
| 6 | O | $\overline{\text{CP5}}$ | 30 | I | TEST | 54 | I | MS1 | 78 | I | AD6 |
| 7 | O | CL | 31 | O | BQ9 | 55 | I | MS2 | 79 | I | AD7 |
| 8 | O | $\overline{\text{DIS}}$ | 32 | O | BQ8 | 56 | I | MS3 | 80 | I | $\overline{\text{STV.D}}$ |
| 9 | O | $\overline{\text{QSH}}$ | 33 | O | BQ7 | 57 | O | AQ0 | 81 | I | $\overline{\text{RIST}}$ |
| 10 | O | WRP | 34 | O | BQ6 | 58 | O | AQ1 | 82 | I | $\overline{\text{RDGT}}$ |
| 11 | O | $\overline{\text{QT}}$ | 35 | I | CLR | 59 | — | Vcc | 83 | I | $\overline{\text{SCCLK}}$ |
| 12 | — | GND | 36 | O | PCLK | 60 | — | GND | 84 | — | Vcc |
| 13 | O | $\overline{\text{SP}}$ | 37 | I | VCLK | 61 | O | AQ2 | 85 | I | GATE |
| 14 | O | CK4M | 38 | O | XCLKM | 62 | O | AQ3 | 86 | O | RXDB |
| 15 | O | GQ0 | 39 | I | T0 | 63 | O | AQ4 | 87 | O | $\overline{\text{SYNCB}}$ |
| 16 | O | GQ1 | 40 | — | GND | 64 | O | AQ5 | 88 | I | CGCLK |
| 17 | O | GQ2 | 41 | I | ALE | 65 | O | AQ6 | 89 | I | DCLK |
| 18 | O | GQ3 | 42 | I | $\overline{\text{CGATE}}$ | 66 | I | AQ7 | 90 | O | $\overline{\text{RXCA}}$ |
| 19 | O | GQ4 | 43 | I | $\overline{\text{G2DFM}}$ | 67 | O | AQ8 | 91 | O | RRDY |
| 20 | O | GQ5 | 44 | I | $\overline{\text{SYCLP}}$ | 68 | O | AQ9 | 92 | I | RVID |
| 21 | O | GQ6 | 45 | I | SLCT | 69 | | N.C. | 93 | I | CLK1 |
| 22 | | N.C. | 46 | | N.C. | 70 | | N.C. | 94 | I | $\overline{\text{CLEAR}}$ |
| 23 | | N.C. | 47 | | N.C. | 71 | O | AQ10 | 95 | | N.C. |
| 24 | O | GQ7 | 48 | O | SMPLCK | 72 | I | AD0 | 96 | | N.C. |

I: Input buffer
O: Output buffer

VHILZ92F33/−1

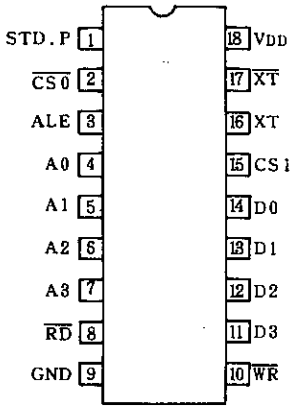


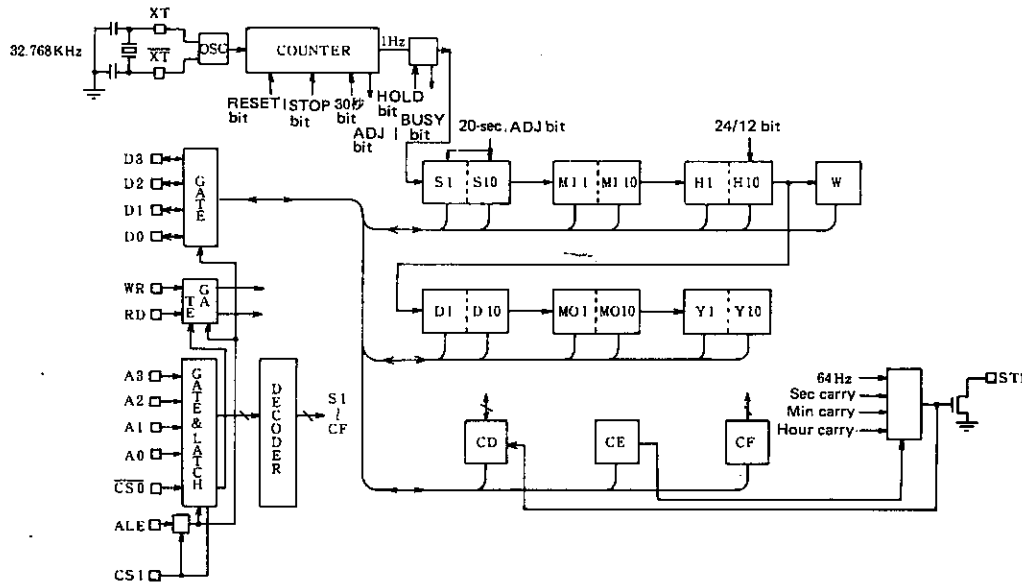




| PIN No. | I/O | Signal | PIN No. | I/O | Signal | PIN No. | I/O | Signal | PIN No. | I/O | Signal |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | I | SP | 26 | O | $\overline{WE}$ | 51 | O | ROA11 | 76 | I | BCNT0 |
| 2 | I | RCP125 | 27 | I | TST1 | 52 | O | ROA10 | 77 | I | HCNT2 |
| 3 | O | ADCK | 28 | I | 3OR2 | 53 | O | ROA9 | 78 | I | HCNT1 |
| 4 | I | AD3 | 29 | O | RC01 | 54 | O | ROA8 | 79 | I | HCNT0 |
| 5 | I | AD2 | 30 | O | RC02 | 55 | O | ROA7 | 80 | I | ORE |
| 6 | I | AD1 | 31 | O | RA11 | 56 | O | ROA6 | 81 | O | DI2 |
| 7 | I | AD0 | 32 | O | RA10 | 57 | O | ROA5 | 82 | I | DO2 |
| 8 | I/O | 3RD3 | 33 | O | RA9 | 58 | O | ROA4 | 83 | O | WR2 |
| 9 | I/O | 3RD2 | 34 | O | RA8 | 59 | O | ROA3 | 84 | I | WRP |
| 10 | I/O | 3RD1 | 35 | O | RA7 | 60 | O | ROA2 | 85 | O | RVID |
| 11 | I/O | 3RD0 | 36 | O | RA6 | 61 | O | ROA1 | 86 | I | RDGT |
| 12 | − | GND | 37 | O | RA5 | 62 | O | ROA0 | 87 | I | RRDY |
| 13 | I/O | 2RD3 | 38 | O | RA4 | 63 | − | GND | 88 | I | SRESET |
| 14 | I/O | 2RD2 | 39 | O | RA3 | 64 | I | OD7 | 89 | − | Vcc |
| 15 | I/O | 2RD1 | 40 | − | GND | 65 | I | OD6 | 90 | − | GND |
| 16 | I/O | 2RD0 | 41 | O | RA2 | 66 | I | OD5 | 91 | O | SRRDY |
| 17 | I/O | 1RD3 | 42 | O | RA1 | 67 | I | OD4 | 92 | I | STVD |
| 18 | I/O | 1RD2 | 43 | O | RA0 | 68 | I | OD3 | 93 | I | REDUL |
| 19 | I/O | 1RD1 | 44 | O | S5 | 69 | I | OD2 | 94 | O | LSTVD |
| 20 | I/O | 1RD0 | 45 | O | S4 | 70 | I | OD1 | 95 | I | HLCLR |
| 21 | − | GND | 46 | O | S3 | 71 | I | OD0 | 96 | I | SCCLK |
| 22 | I | GATE | 47 | O | S2 | 72 | O | BOUT | 97 | O | LNSTA |
| 23 | O | OE | 48 | O | S1 | 73 | I | BORH | 98 | I | LNSTB |
| 24 | O | $\overline{CS}$ | 49 | O | S0 | 74 | I | BCNT2 | 99 | I | LNST |
| 25 | O | $\overline{OE}$ | 50 | O | CEN | 75 | I | BCNT1 | 100 | I | STIM |

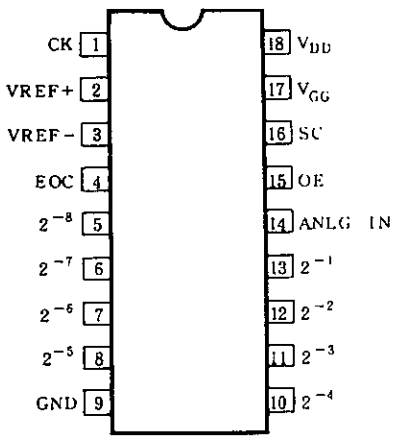
I: Input buffer
O: Output buffer
I/O: Input/output buffer

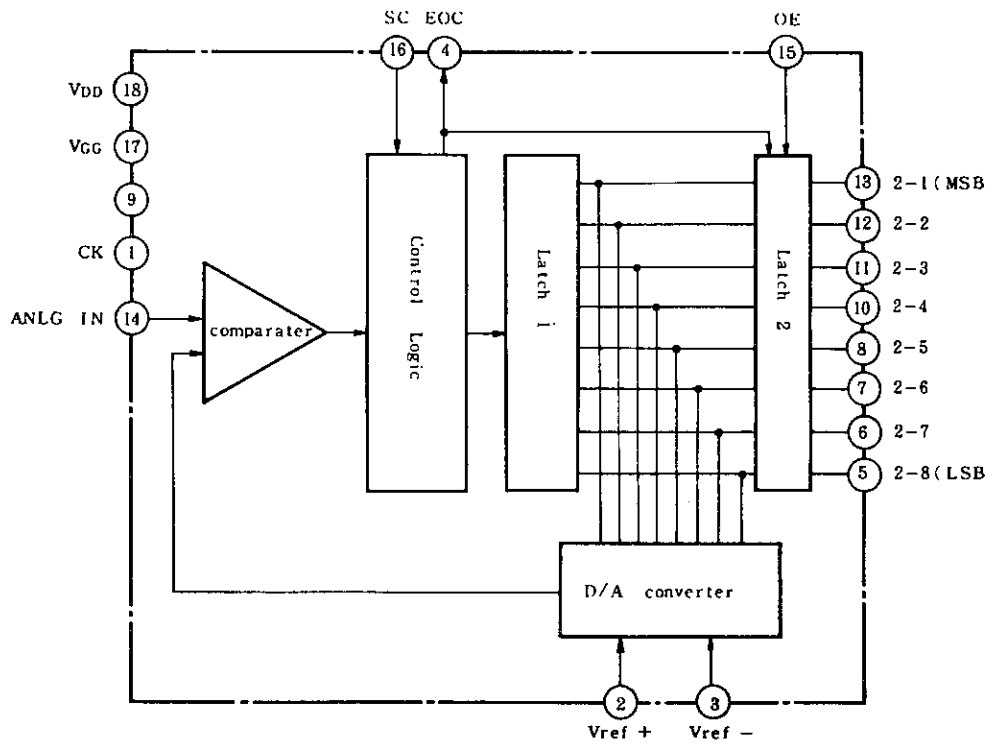
## VHIMSM6242RS1



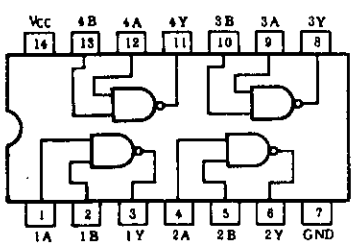




## VHIT3985///-1




## VHITC74HC00FN

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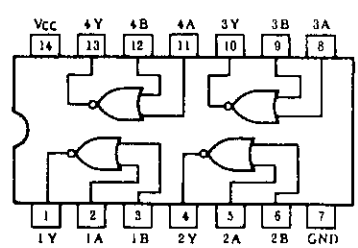
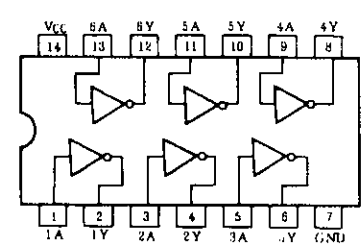



## VHITC74HC04FN



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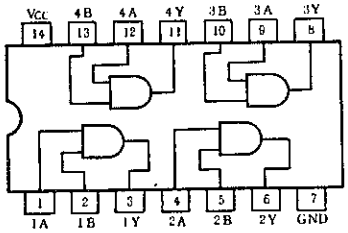
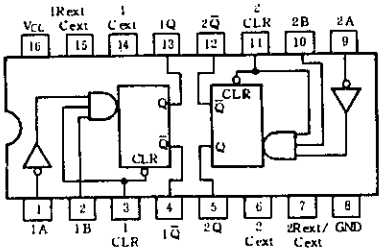



## VHITC74HC123F

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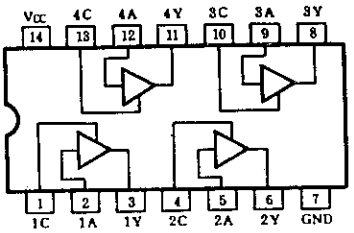
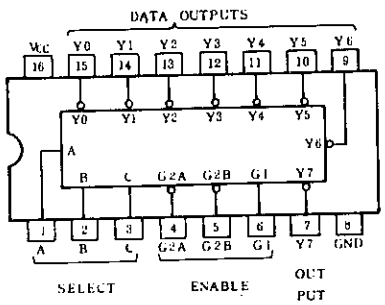
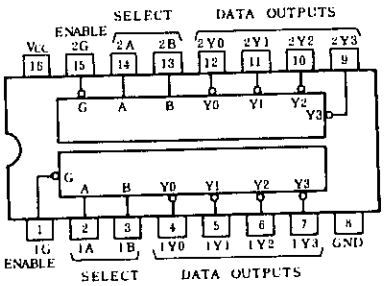


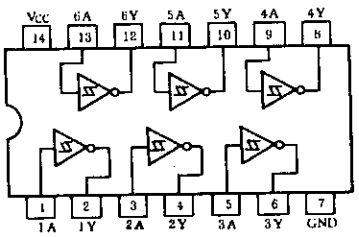

## VHITC74HC138F



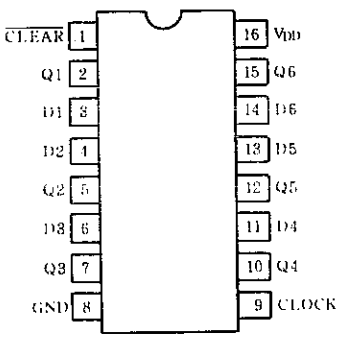

## VHITC74HC139F

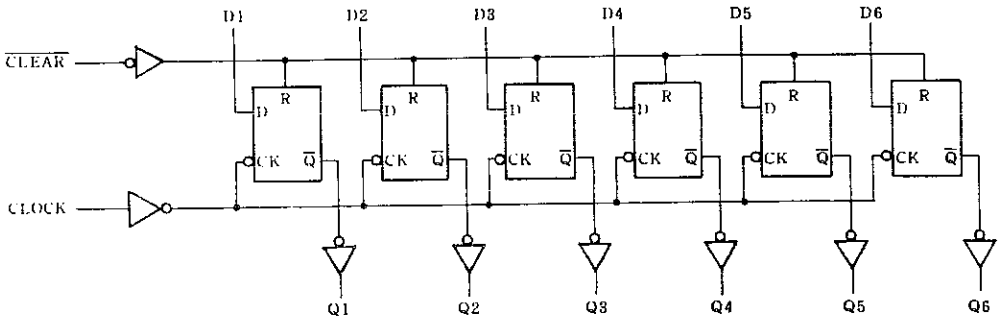

SELECT DATA OUTPUTS
ENABLE
Vcc 2G 2A 2B 2Y0 2Y1 2Y2 2Y3
16 15 14 13 12 11 10 9
G A B Y0 Y1 Y2 Y3
1 2 3 4 5 6 7 8
1G 1A 1B 1Y0 1Y1 1Y2 1Y3 GND
ENABLE SELECT DATA OUTPUTS

## VHITC74HC14FN

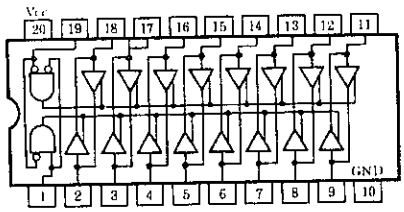



## VHITC74HC174F

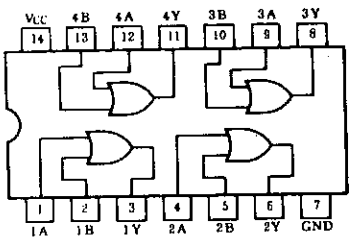


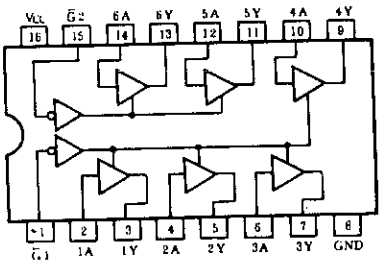

## VHITC74HC245F



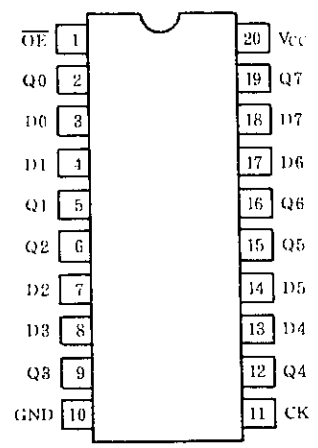

## VHITC74HC32FN

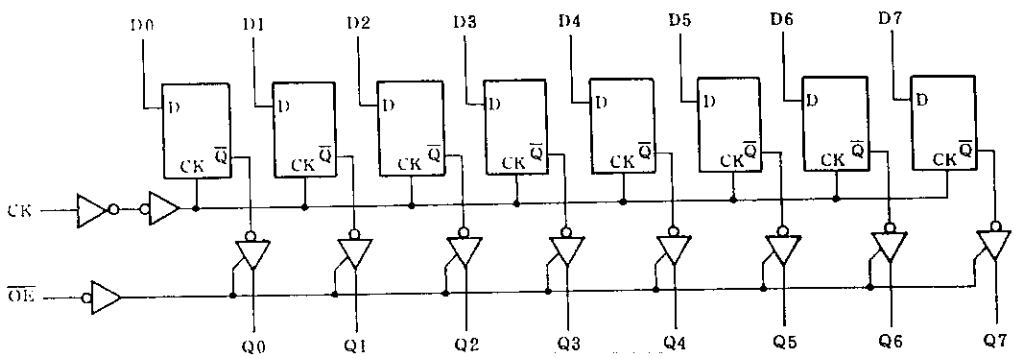



## VHITC74HC376F

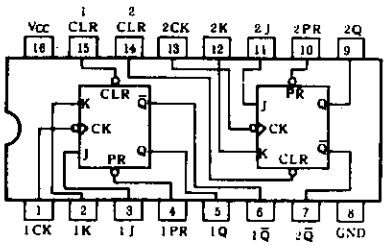



## VHITC74HC374F

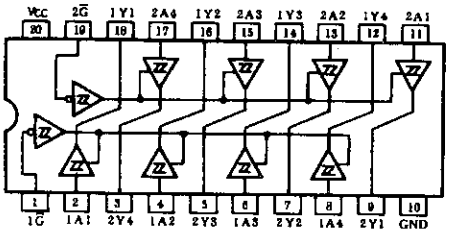


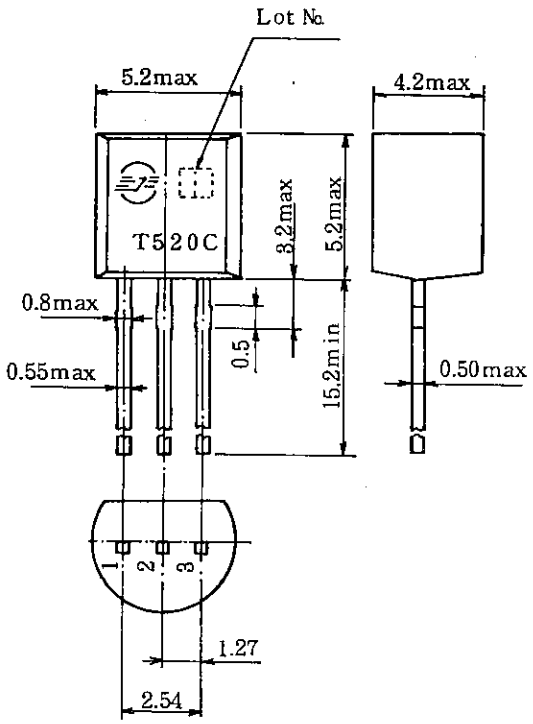
## VHITC74HC74FN



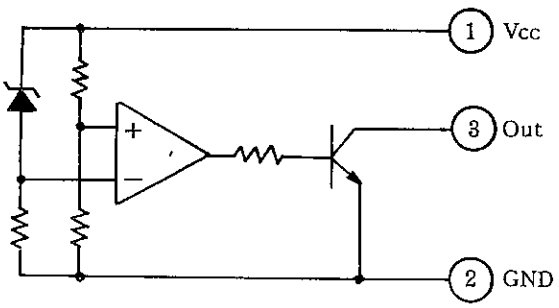

## VHITC74HC244F



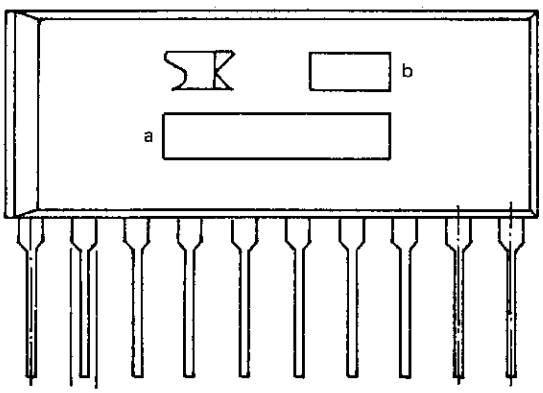

## VHIPST520C-2/

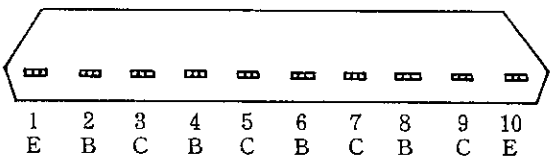



### ■EQUIVALENT CIRCUIT



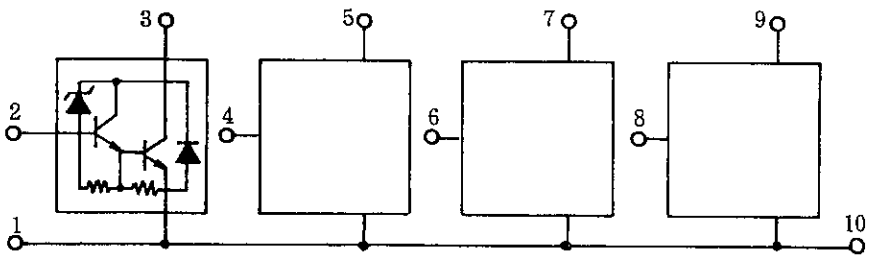

## VHISTA403A/-1'



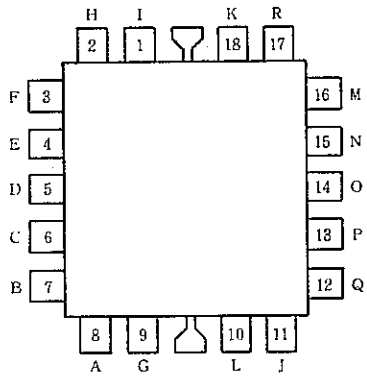




a: Product name
b: Lot number

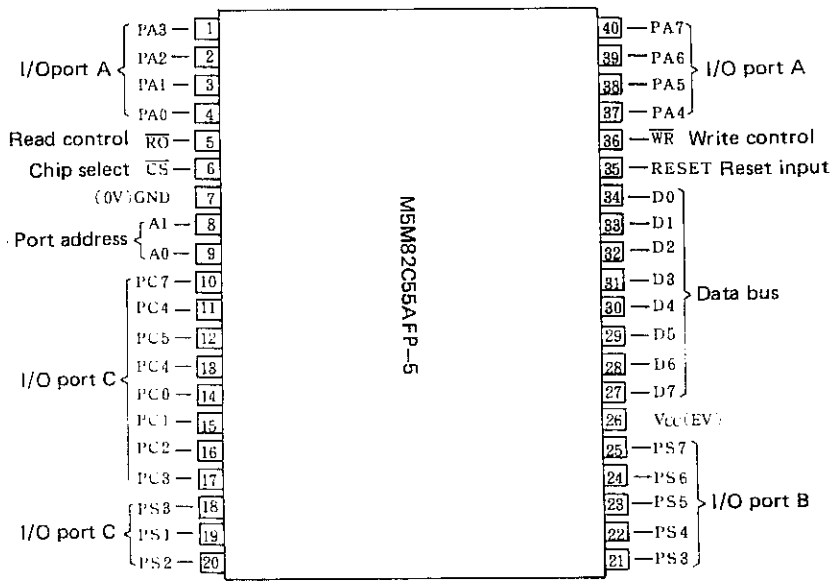
E: Emitter
B: Base
C: Collector



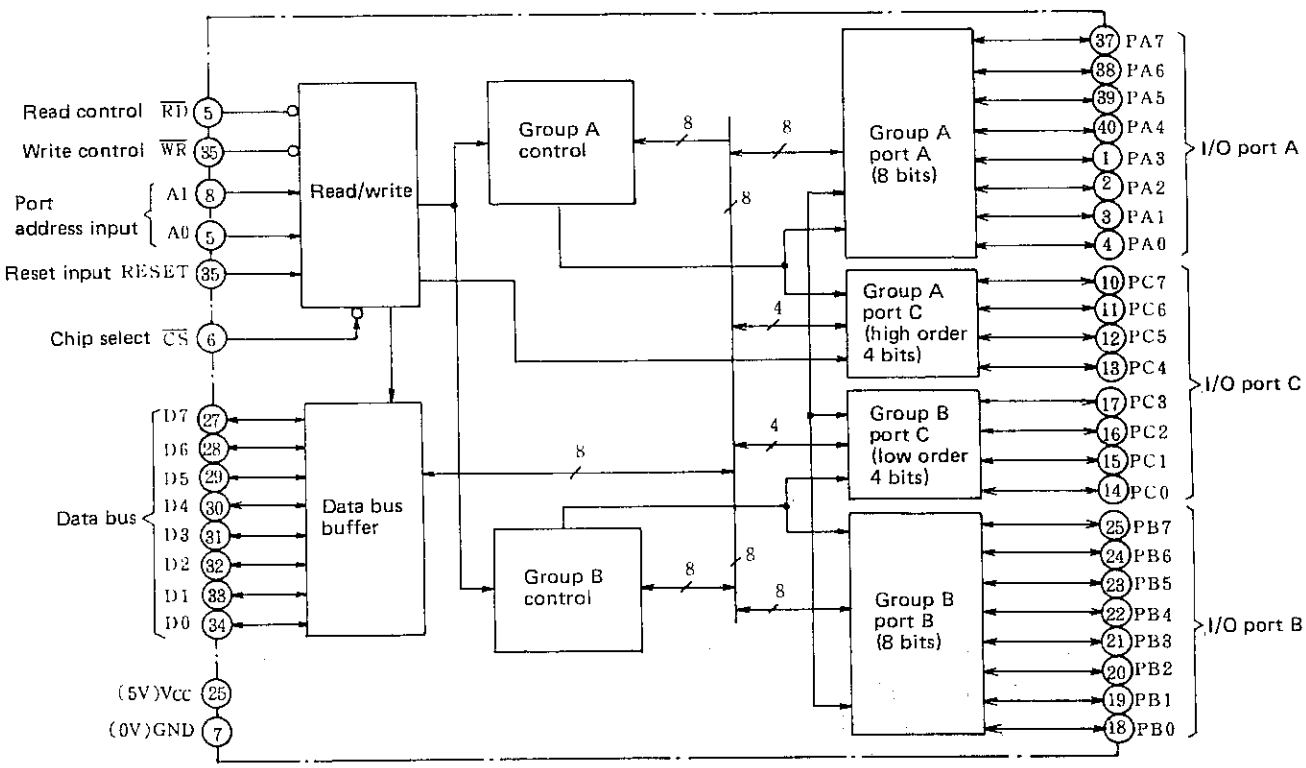
## VHIHA19203MPN



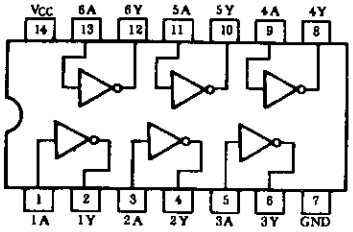

## VHIM5M82C55−1



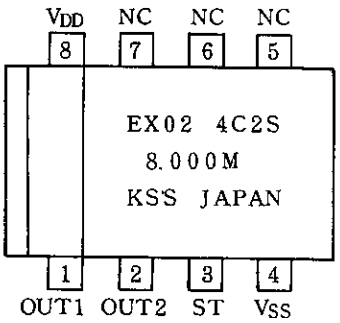

Outlook : 40P2R



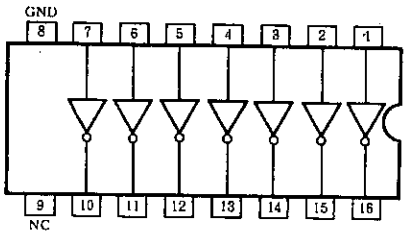
## VHIM53204P/−1



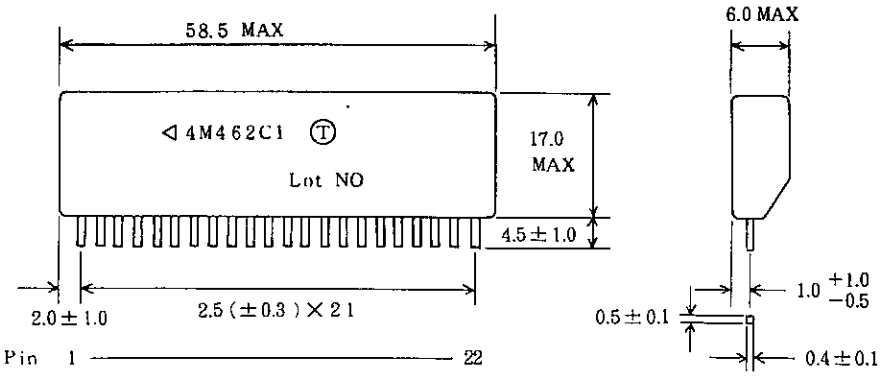

## RCRSQ2038SCZZ




## VHIM54519P/−1




## VHI4M462C1/−1

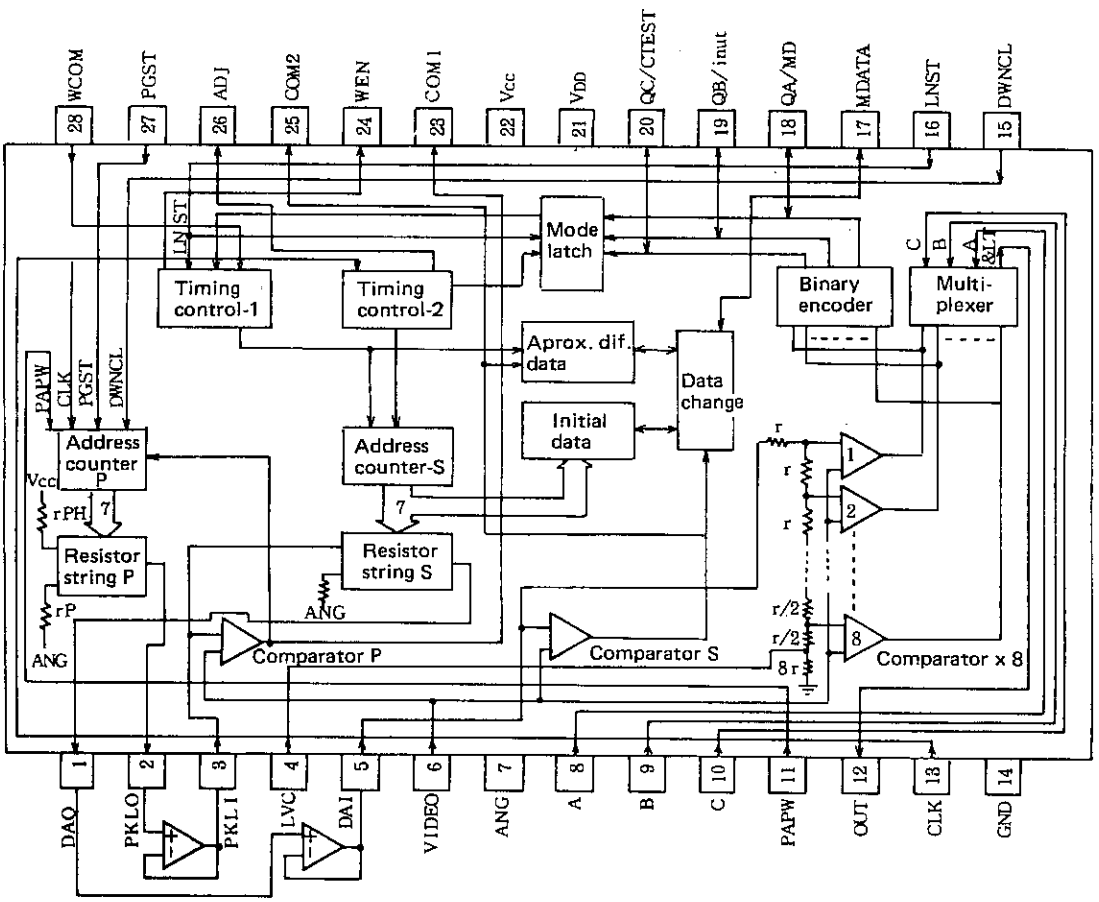



単位 : mm

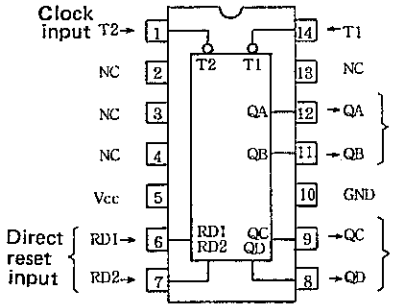
**Pin configuration**

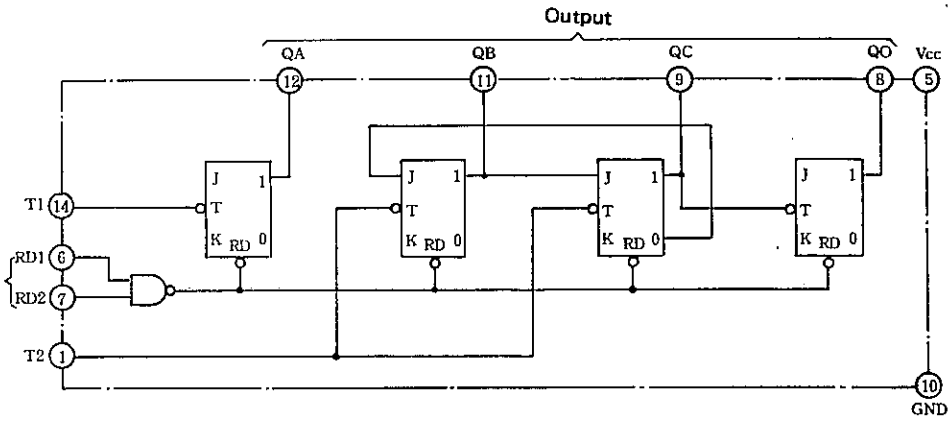
| | |
|---|---|
| 1. +12V | 12. AT1 |
| 2. PIS DET | 13. AT2 |
| 3. OUTPUT C | 14. AT3 |
| 4. OUTPUT B | 15. AT4 |
| 5. GND | 16. AT5 |
| 6. −12V | 17. AT6 |
| 7. BPF OUT | 18. AT7 |
| 8. RX OUT | 19. AT8 |
| 9. R2 | 20. TX OUT/RX IN |
| 10. R1 | 21. OUTPUT A |
| 11. TX IN | 22. R3 |

## VHIHD46304/−1

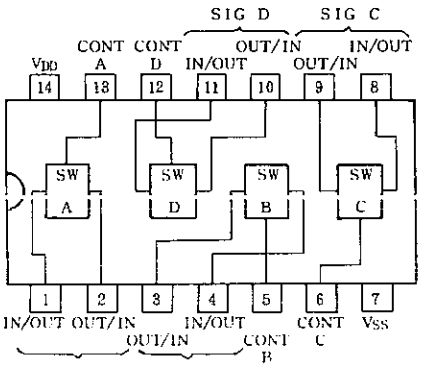


## VHI74LS92//-F

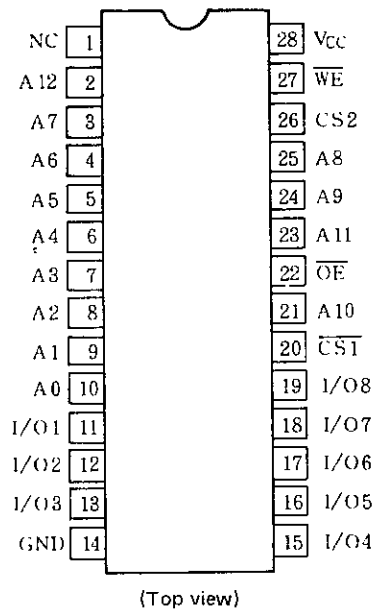



## VHIUPD4066BG1

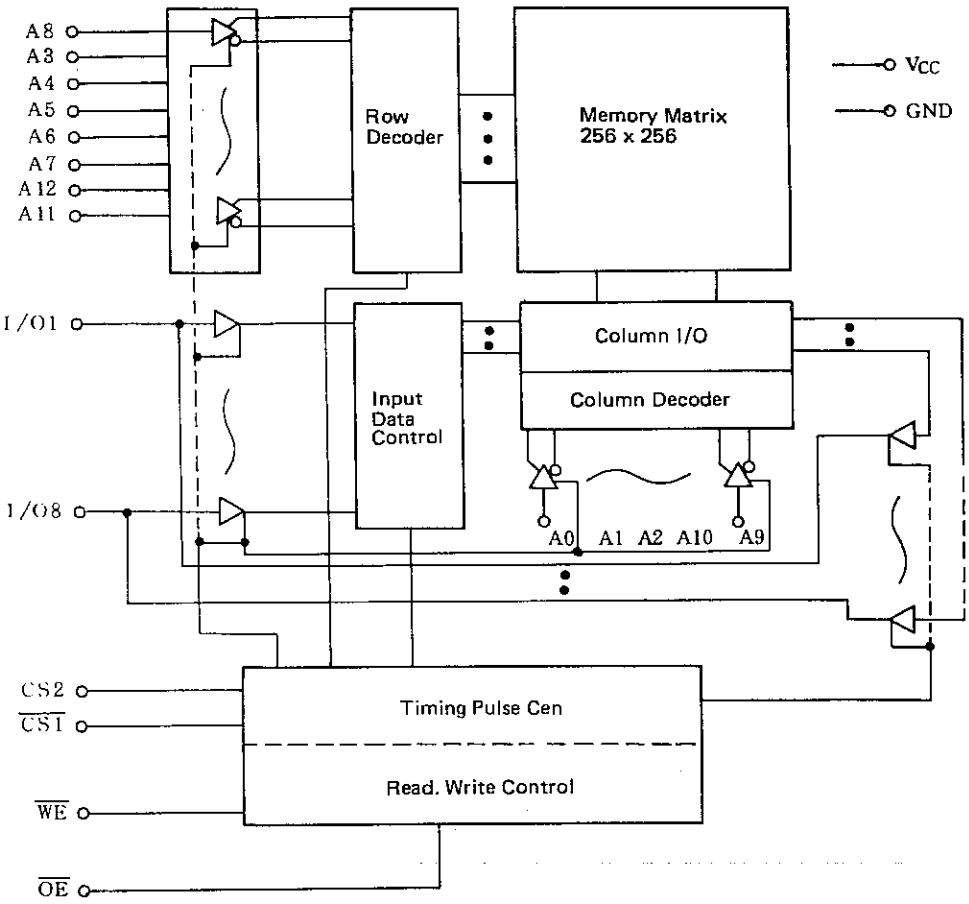



## VHIHM6264LF15



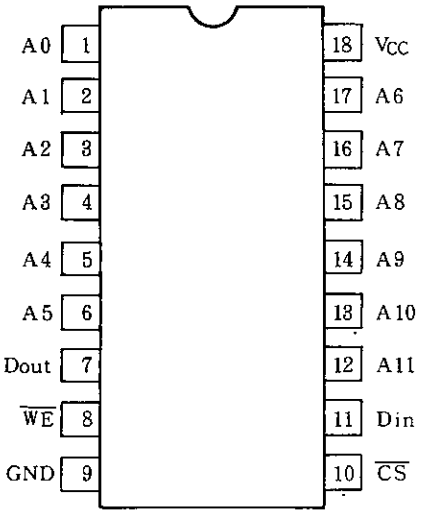

(Top view)

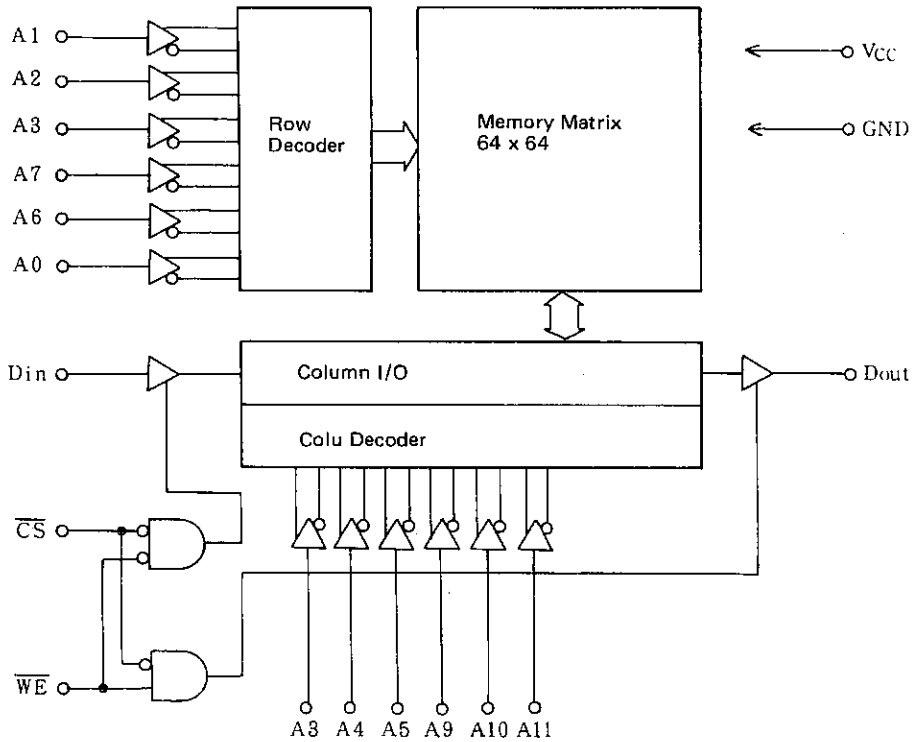
■ Block diagram



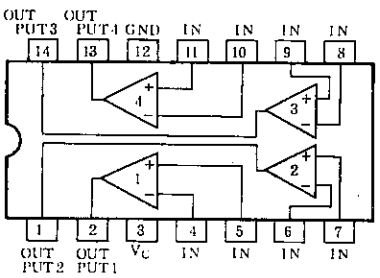
## VHIHM6147LP-1

**Block diagram**

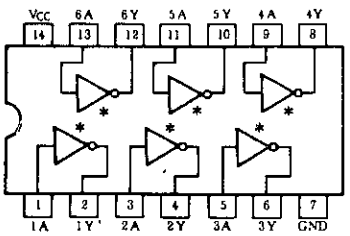


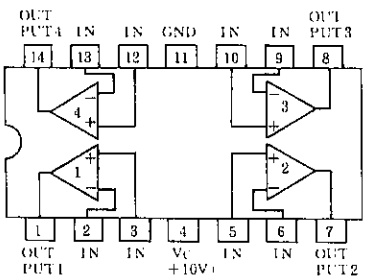

## VHIIR2339//-1




## VHIM53206P/-1




## VHITL084CN/-F



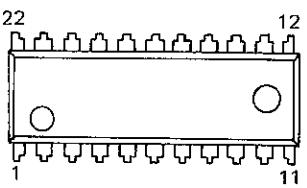

## VHILZ91B15/-1

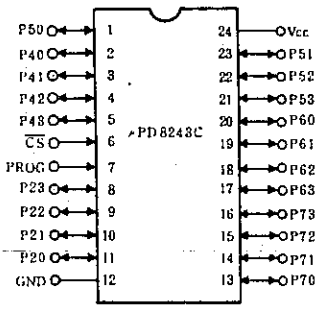
**Pin configuration**

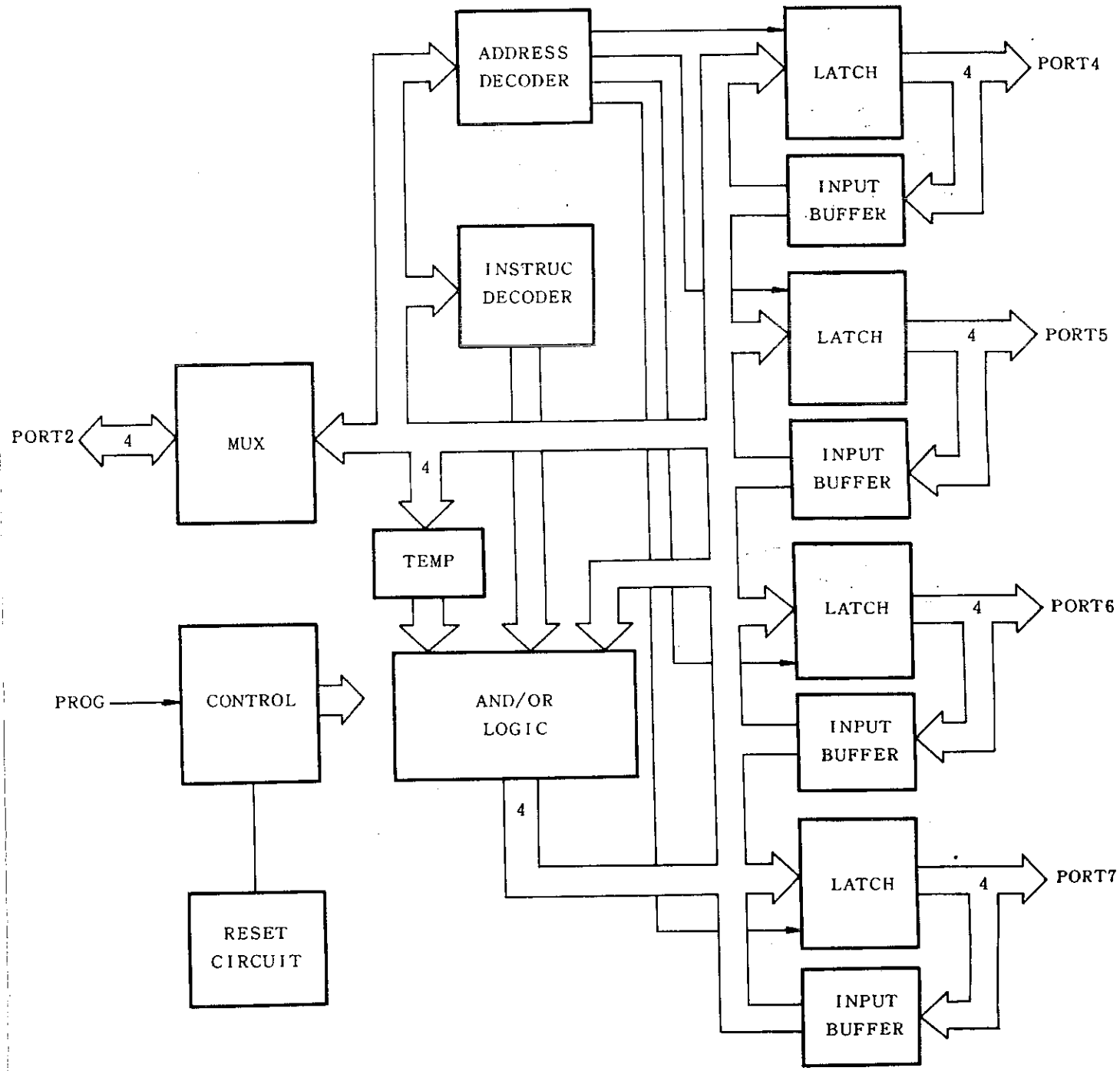
| Pin No. | I/O | Signal name | Pin No. | I/O | Signal name |
|---|---|---|---|---|---|
| 1 | I | CK1 | 12 | O | GTXD |
| 2 | O | CK2 | 13 | I | VRX2 |
| 3 | I | NFM | 14 | I | RXD |
| 4 | I | NFMC | 15 | O | MD |
| 5 | O | MOD1 | 16 | I | TRX |
| 6 | O | MOD2 | 17 | O | VRX1 |
| 7 | I | MPHS | 18 | O | CP4 |
| 8 | I | SYNC | 19 | I | CK4 |
| 9 | I | MPHC | 20 | | (NC) |
| 10 | I | MOUT | 21 | | (NC) |
| 11 | | (GND) | 22 | | (Vcc) |

I : INPUT
O: OUTPUT

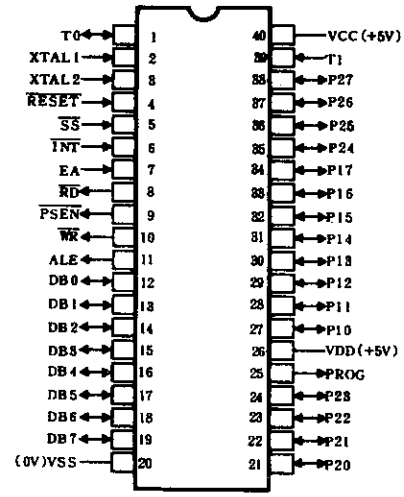
**22DIP** (GND: No.11 pin)

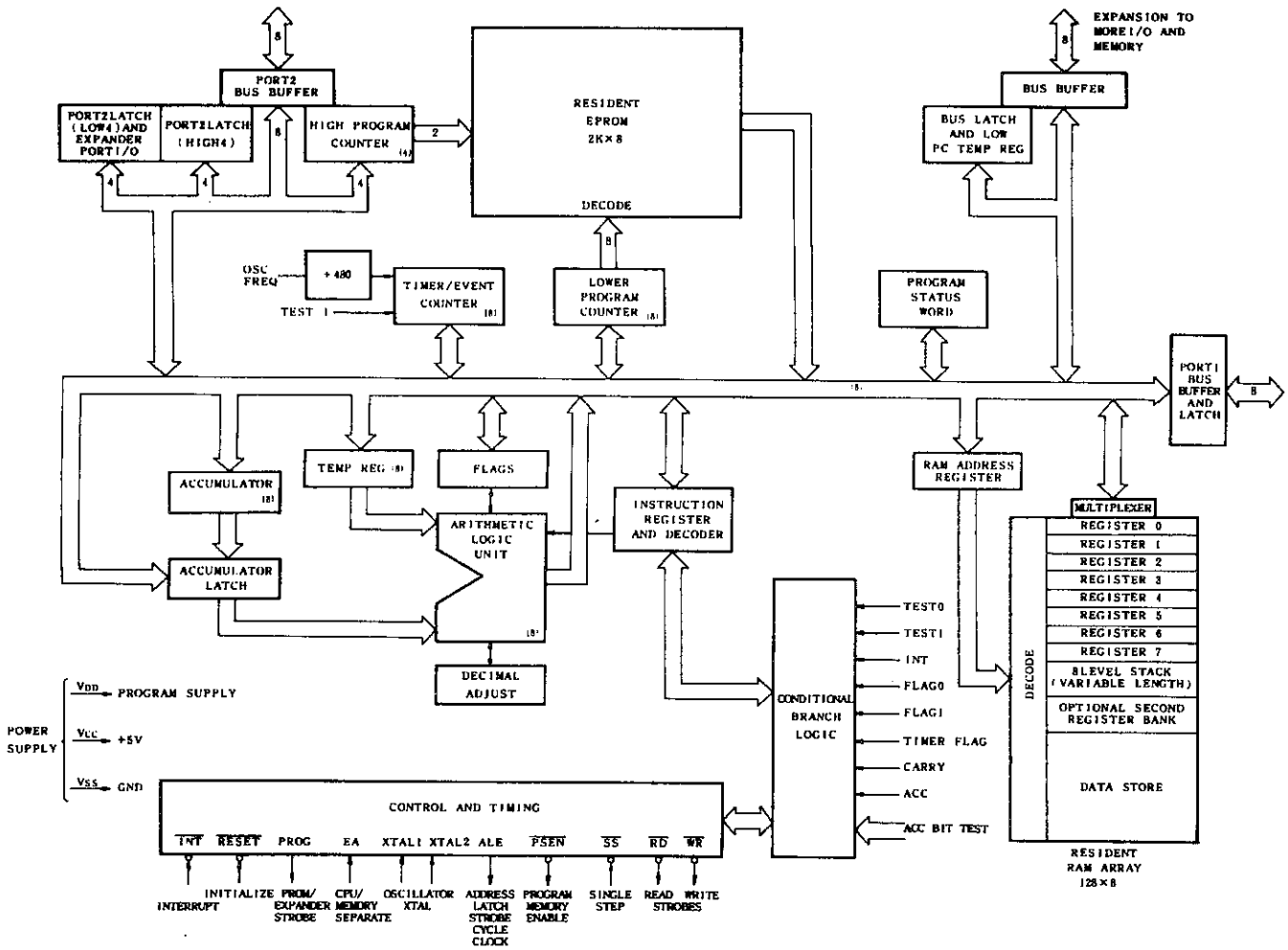



P50 1
P40 2
P41 3
P42 4
P43 5
CS 6
PROG 7
P23 8
P22 9
P21 10
P20 11
GND 12
μPD8243C
24 Vcc
23 P51
22 P52
21 P53
20 P60
19 P61
18 P62
17 P63
16 P73
15 P72
14 P71
13 P70


ADDRESS DECODER
INSTRUC DECODER
MUX
TEMP
CONTROL
AND/OR LOGIC
RESET CIRCUIT
PROG
PORT2
4
LATCH
INPUT BUFFER
PORT4
PORT5
PORT6
PORT7

## VHI8749////-1


T0
XTAL1
XTAL2
RESET
SS
INT
EA
RD
PSEN
WR
ALE
DB0
DB1
DB2
DB3
DB4
DB5
DB6
DB7
(0V)VSS
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
40
39
38
37
36
35
34
33
32
31
30
29
28
27
26
25
24
23
22
21
VCC(+5V)
T1
P27
P26
P25
P24
P17
P16
P15
P14
P13
P12
P11
P10
VDD(+5V)
PROG
P23
P22
P21
P20


PORT2 BUS BUFFER
PORT2 LATCH (LOW4) AND EXPANDER PORT I/O
PORT2 LATCH (HIGH4)
HIGH PROGRAM COUNTER
RESIDENT EPROM 2K×8
DECODE
EXPANSION TO MORE I/O AND MEMORY
BUS BUFFER
BUS LATCH AND LOW PC TEMP REG
OSC FREQ
÷480
TEST 1
TIMER/EVENT COUNTER
LOWER PROGRAM COUNTER
PROGRAM STATUS WORD
PORT1 BUS BUFFER AND LATCH
ACCUMULATOR
ACCUMULATOR LATCH
TEMP REG
FLAGS
ARITHMETIC LOGIC UNIT
INSTRUCTION REGISTER AND DECODER
RAM ADDRESS REGISTER
MULTIPLEXER
REGISTER 0
REGISTER 1
REGISTER 2
REGISTER 3
REGISTER 4
REGISTER 5
REGISTER 6
REGISTER 7
8LEVEL STACK (VARIABLE LENGTH)
OPTIONAL SECOND REGISTER BANK
DATA STORE
DECODE
RESIDENT RAM ARRAY 128×8
DECIMAL ADJUST
CONDITIONAL BRANCH LOGIC
TEST0
TEST1
INT
FLAG0
FLAG1
TIMER FLAG
CARRY
ACC
ACC BIT TEST
POWER SUPPLY
VDD PROGRAM SUPPLY
VCC +5V
VSS GND
CONTROL AND TIMING
INT RESET PROG EA XTAL1 XTAL2 ALE PSEN SS RD WR
INTERRUPT
INITIALIZE
PROM/ EXPANDER STROBE
CPU/ MEMORY SEPARATE
OSCILLATOR XTAL
ADDRESS LATCH STROBE CYCLE CLOCK
PROGRAM MEMORY ENABLE
SINGLE STEP
READ STROBES
WRITE STROBES

# SHARP PARTS GUIDE

CODE: 00ZF200D1PG1E

# FACSIMILE

## MODEL FO200

CONTENTS


1 Hopper guide
2 Top cover etc.
3 Mechanism section No. 1
4 Document guide
5 Frame unit
6 Sub-frame unit
7 Operation unit
8 Packing material & Accessories
9 Control board
10 Power supply unit
11 Liu board (Holland)
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13 Modem interface board
14 Receive sensor board
50 Hardware parts
■ Index


Parts marked with "⚠" is important for maintaining the safety of the set. Be sure to replace these parts with specified ones for maintaining the safety and performance of the set.

SHARP CORPORATION

## 1 Hopper guide

| NO. | PARTS CODE | PRICE RANK | NEW MARK | PART RANK | DESCRIPTION |
|---|---|---|---|---|---|
| 1 | NGERP2059SCZZ | AC | | C | Pinion gear |
| 2 | MSPRC2209SCZZ | AB | | C | Hopper spring |
| 3 | NGERH2058SCZB | AC | | C | Rack gear |
| 5 | CHÖP-2045SC03 | AP | | E | Hopper ass'y |
| 6 | PGiDP2193SCZB | AC | | C | Hopper guide L |
| 7 | PGiDP2192SCZB | AC | | C | Hopper guide R |

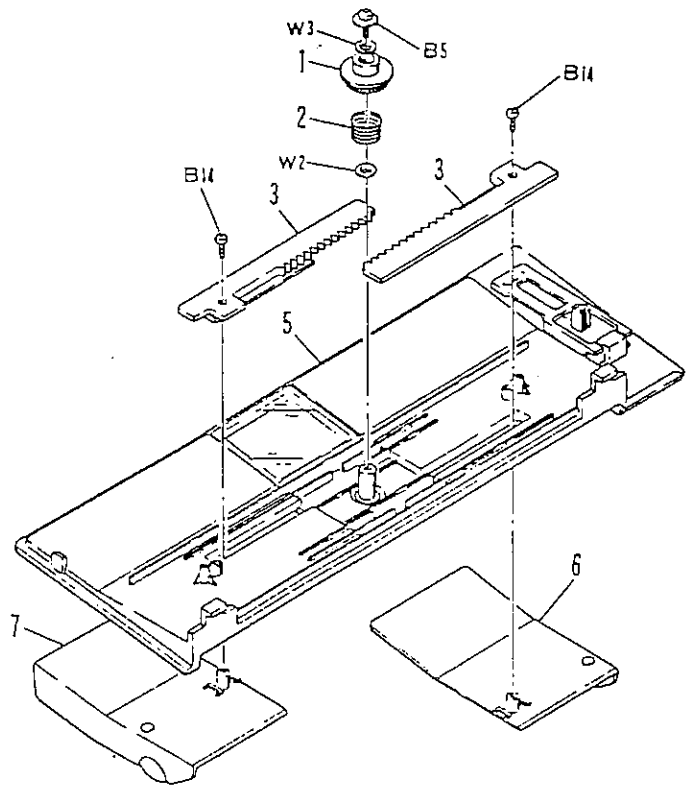
## 2 Top cover etc.

| NO. | PARTS CODE | PRICE RANK | NEW MARK | PART RANK | DESCRIPTION |
|---|---|---|---|---|---|
| 1 | PGiDH2189SCZZ | AE | | C | Hopper sub guide |
| 2 | GCÖVA2222SCZC | AR | | C | Top cover |
| 3 | JKNBZ2025SCZB | AB | | C | Knob |
| 4 | MSPRT2219SCZZ | AA | | C | Knob spring |
| 5 | GCÖVA2224SCZD | AH | | C | Sub frame cover |
| 6 | GCÖVA2230SCZZ | AL | | C | Cover,PS |

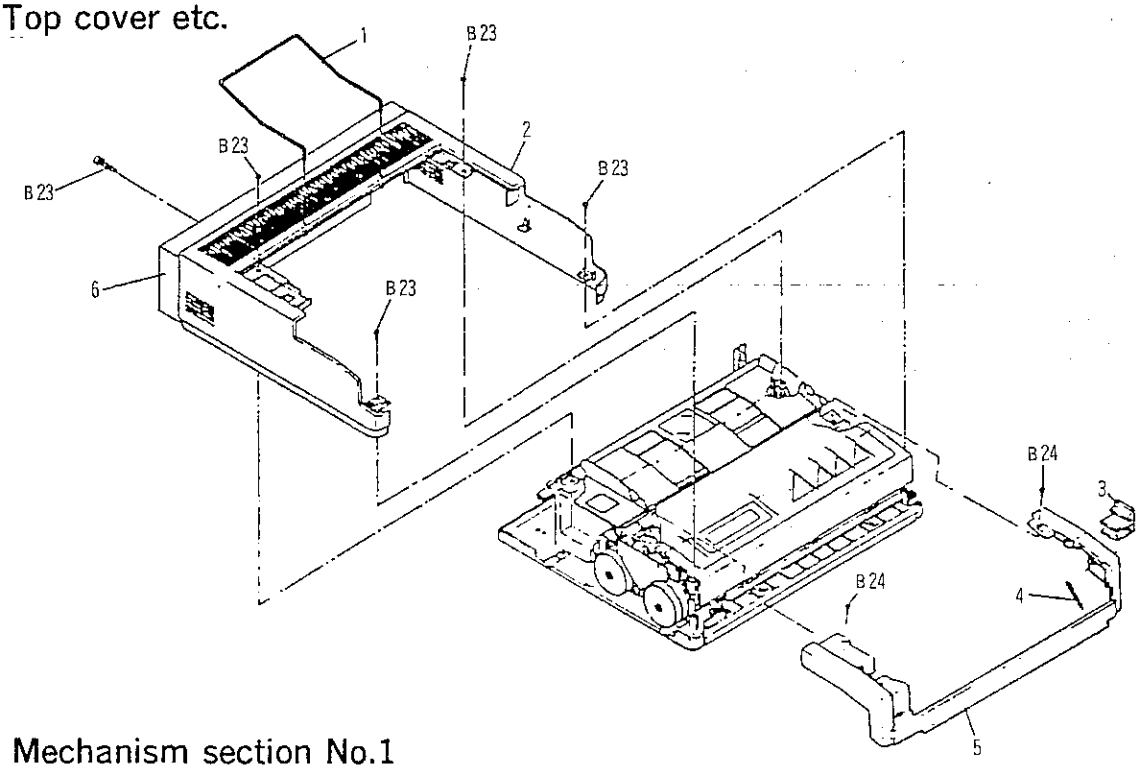
## 3 Mechanism section No.1

| NO. | PARTS CODE | PRICE RANK | NEW MARK | PART RANK | DESCRIPTION |
|---|---|---|---|---|---|
| 1 | DUNTK3987SCZZ | CD | | E | Modem unit |
| 2 | PSHEZ2276SCZZ | AB | | C | Modem sheet |
| 3 | MSPRT2213SCZZ | AC | | C | Spring (Right) |
| 4 | DUNTK3891SCZZ | CV | N | E | Control board [Germany] |
| | DUNTK4820SCZZ | CV | N | E | Control board [Other countries] |
| 5 | QSW-M2120SCZZ | AG | | B | Microswitch |
| 6 | LHLDW2020SCZZ | AB | | C | Holder,wire |
| 7 | LBNDJ2003SCZZ | AA | | C | Cable clamp (large) |
| 8 | MSPRT2214SCZZ | AC | | C | Spring (Left) |
| 9 | PSHEZ2283SCZZ | AB | | C | Sheet,recording paper |
| 10 | CPWBS1979SC01 | BW | N | E | Liu board [Germany] |
| | CPWBS2014SC01 | BS | N | E | Liu board [Holland] |
| | CPWBS1979SC03 | BW | N | E | Liu board [Other countries] |
| 11 | DUNTK4110SCZZ | CB | | E | Power supply |
| 12 | PSHEZ2284SCZB | AC | | C | Frame sheet 3 |

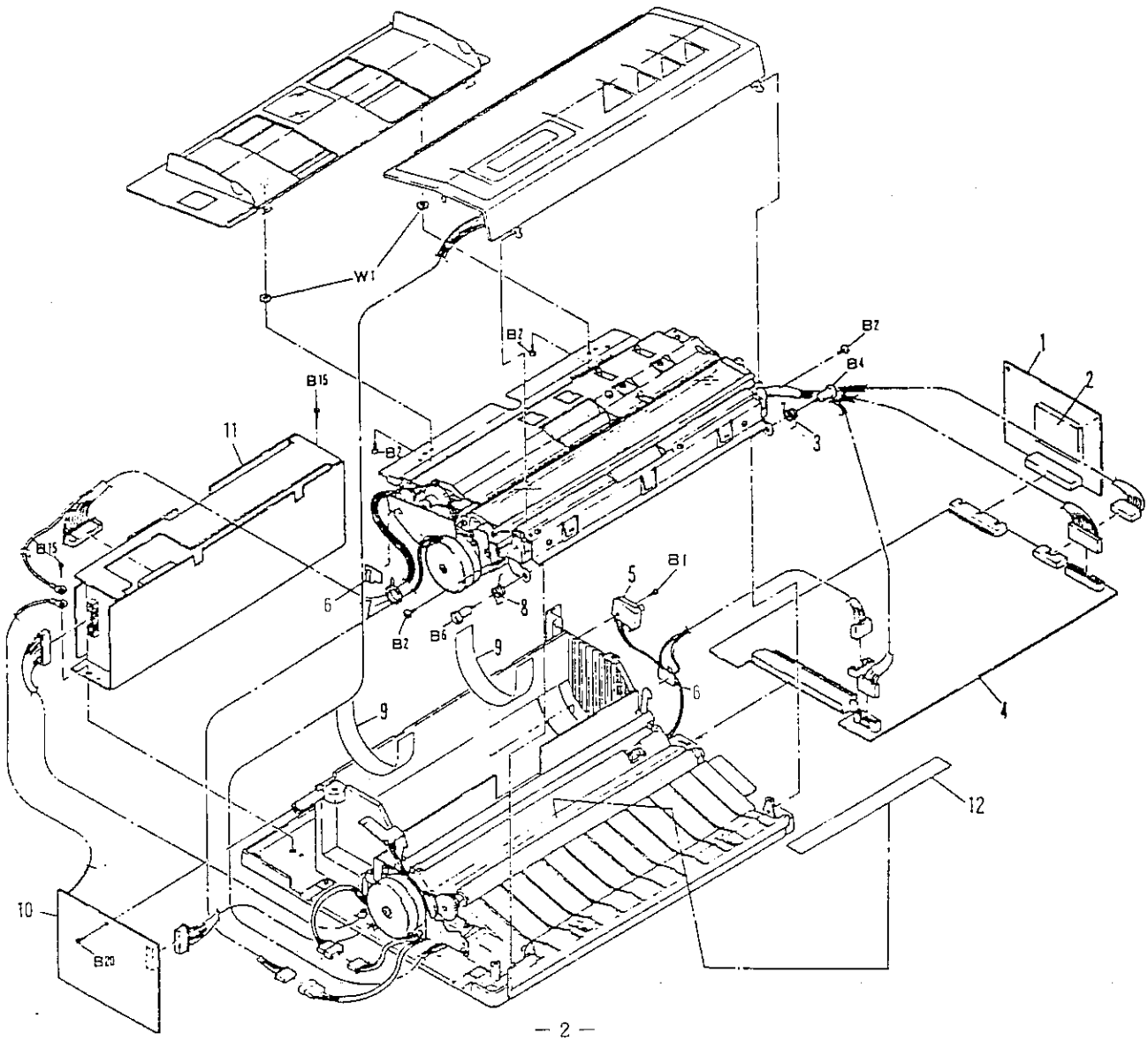
## 1 Hopper guide



## 2 Top cover etc.




## 3 Mechanism section No.1



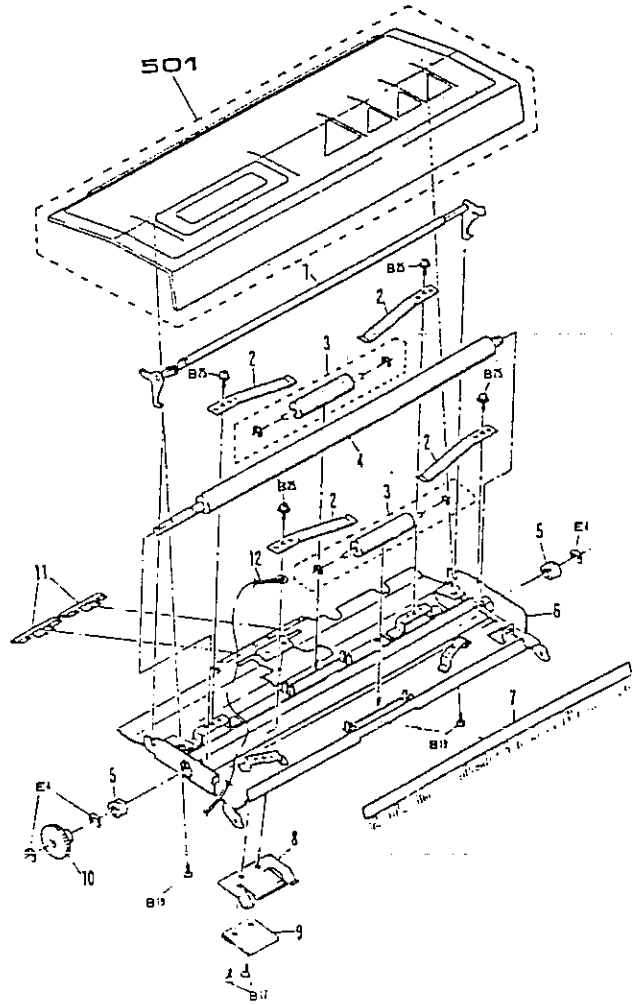
## 4 Document guide

| NO. | PARTS CODE | PRICE RANK | NEW MARK | PART RANK | DESCRIPTION |
|---|---|---|---|---|---|
| 1 | CLEVF2070SC01 | AT | | C | Release lever |
| 2 | MSPRP2205SCZZ | AC | | C | Spring pinch roller |
| 3 | CRÖLP2123SC01 | AM | | C | Pinch roller |
| 4 | NRÖLR2122SCZZ | AU | | C | Roller |
| 5 | NBRGY2079SCZZ | AB | | C | Bearing |
| 6 | PGiDH2190SCZZ | AS | | C | Document guide upper |
| 7 | PBRS-2012SCZZ | AH | | C | Brush,electro static discharger |
| 8 | MSPRP2207SCZZ | AC | | C | Spring,separater |
| 9 | LPLTG2276SCZZ | AF | | C | Rubber,separater |
| 10 | NGERP2057SCZZ | AC | | C | Gear (37Z) |
| 11 | MSPRP2206SCZZ | AC | | C | Pick up spring |
| 12 | QCNW-2827SCZZ | AB | | C | Earth wire |
| 501 | DUNTK4112SCZZ | BK | | E | Operation unit |

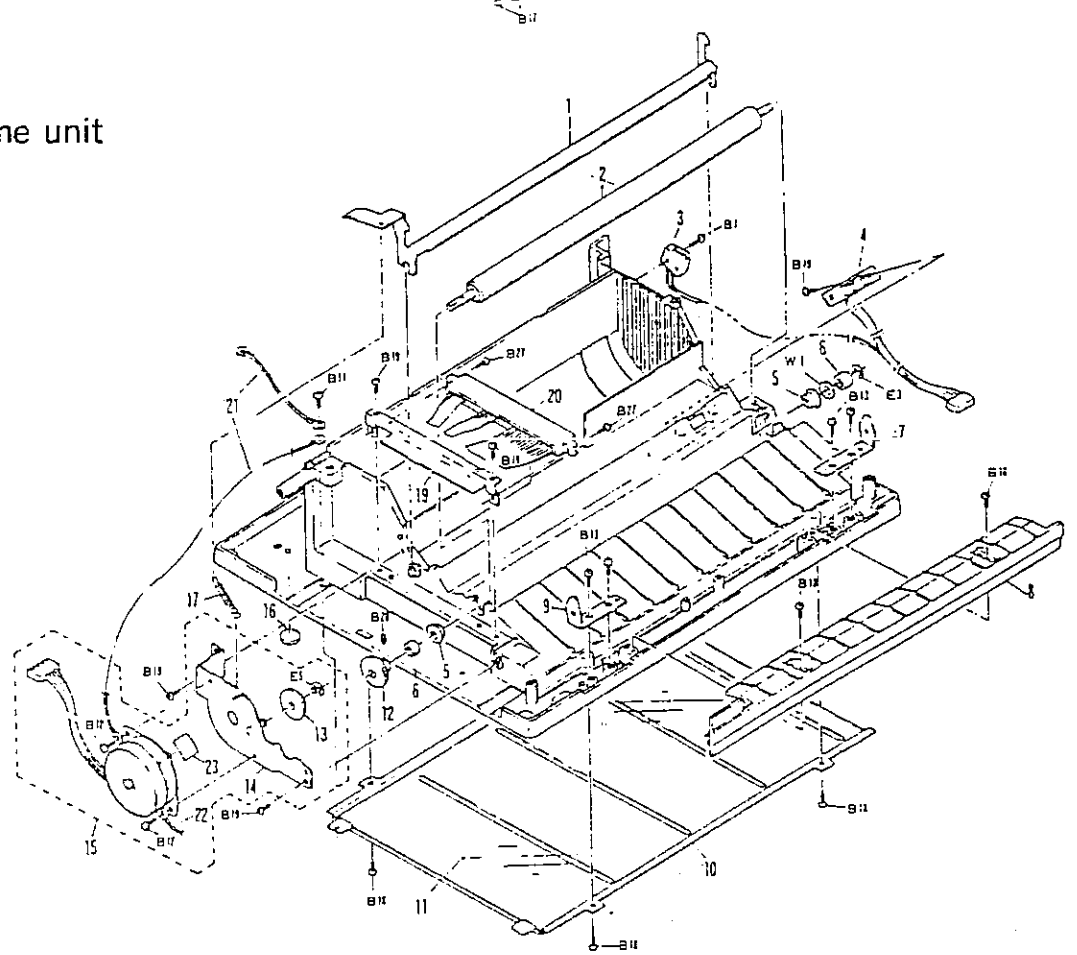
## 5 Frame unit

| NO. | PARTS CODE | PRICE RANK | NEW MARK | PART RANK | DESCRIPTION |
|---|---|---|---|---|---|
| 1 | MLEVM2073SCZZ | AL | | C | Release lever |
| 2 | NRÖLR2128SCZZ | AX | | C | Forward roller,recording paper |
| 3 | QSW-M2120SCZZ | AG | | B | Microswitch |
| 4 | CPWBS1952SC01 | BM | | E | Receive sensor |
| 5 | NBRGY2081SCZZ | AB | | C | Bearing |
| 6 | NBRGY2082SCZZ | AB | | C | Bearing |
| 7 | LANGT2640SCZZ | AC | | C | Frame angle (Right) |
| 8 | LPLTP2279SCZB | AF | | C | Exit guide |
| 9 | LANGT2641SCZZ | AC | | C | Frame angle (Left) |
| 10 | LPLTM2286SCZZ | AK | | C | Bottom plate |
| 11 | PSHEZ2267SCZZ | AL | | C | Insulator sheet |
| 12 | NGERH2068SCZZ | AH | | C | Gear,forward roller |
| 13 | NGERH2069SCZZ | AC | | C | Reduction gear |
| 14 | LPLTM2288SCZZ | AH | | C | Plate,receive motor |
| 15 | CMÖTZ2040SC01 | BC | | E | Receive motor |
| 16 | GLEGG2024SCZZ | AB | | C | Rubber foot |
| 17 | MSPRT2212SCZZ | AA | | C | Spring,release lever |
| 19 | LPLTM2285SCZZ | AE | | C | Plate,connector |
| 20 | QCNW-2880SCZZ | BE | | C | Main cable |
| 21 | QCNW-5097SCZZ | AB | | C | Earth wire |
| 22 | QCNW-2827SCZZ | AB | | C | Earth wire |
| 23 | TLABH2403SCZZ | AA | | C | Caution label |

## 4 Document guide




## 5 Frame unit

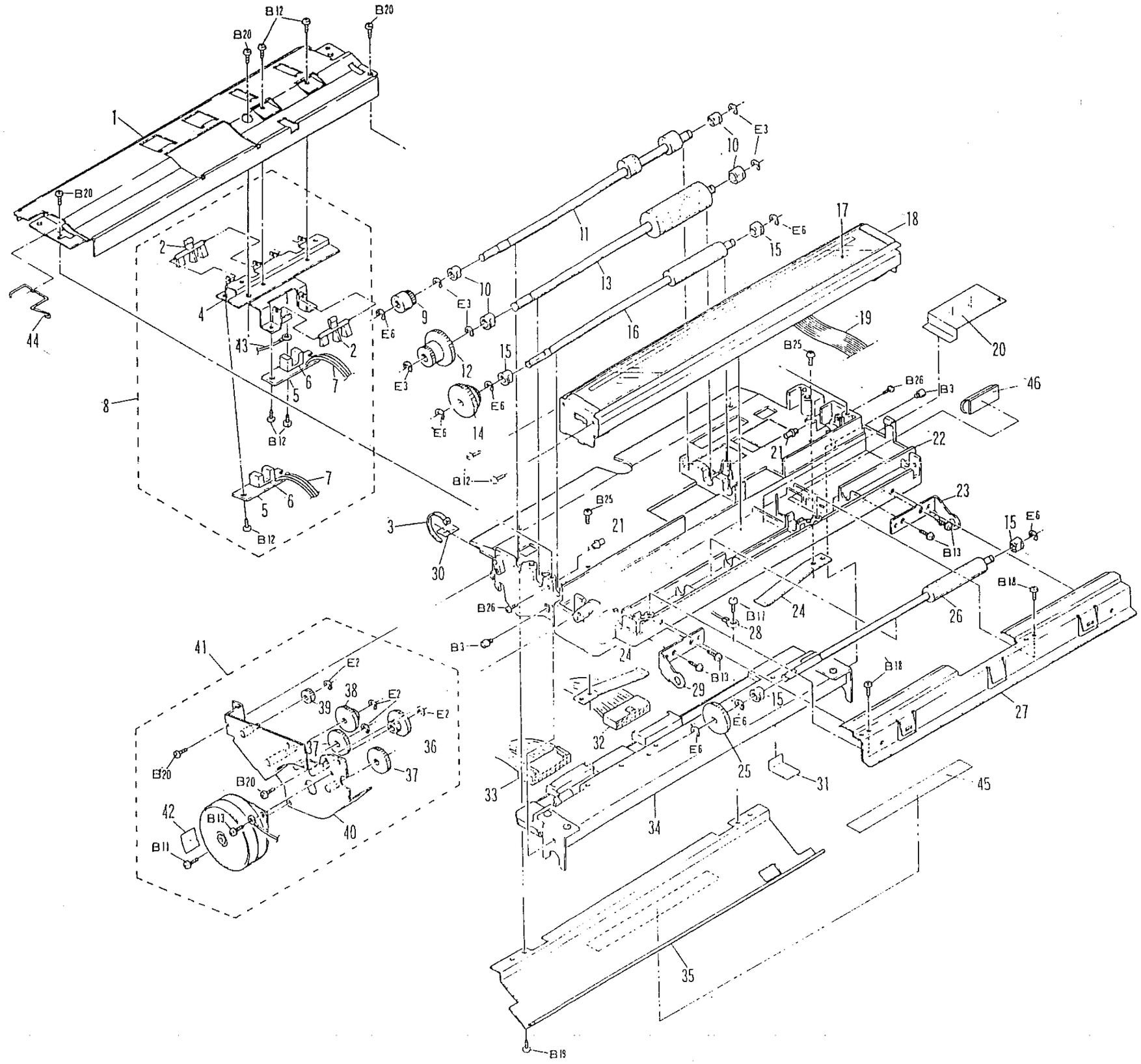


## 6 Sub-Frame unit

| NO. | PARTS CODE | PRICE RANK | NEW MARK | PART RANK | DESCRIPTION |
|---|---|---|---|---|---|
| 1 | PGiDH2191SCZZ | AM | | C | Document guide lower |
| 2 | MLEVP2074SCZA | AC | | C | Sensor lever |
| 3 | LBNDJ2003SCZZ | AA | | C | Cable clamp (large) |
| 4 | LPLTM2293SCZZ | AF | | C | Plate,photo sensor |
| 5 | QPWBF1958SCZZ | AB | | C | Sensor board |
| 6 | VHPGP1S06//-1 | AF | | B | Photo transistor |
| 7 | QCNW-2805SCZZ | AH | | C | Transmit sensor cable |
| 8 | CCNW-2805SC01 | BA | | E | Transmit sensor ass'y |
| 9 | CGERH2071SC01 | AR | | C | Pick up gear ass'y |
| 10 | NBRGY2079SCZZ | AB | | C | Bearing |
| 11 | NRŌLR2124SCZZ | AP | | C | Pick up roller |
| 12 | NGERH2064SCZZ | AR | | C | Forward gear |
| 13 | NRŌLR2125SCZZ | AR | | C | Forward roller |
| 14 | NGERH2066SCZZ | AC | | C | Transfer gear |
| 15 | NBRGY2080SCZZ | AB | | C | Bearing |
| 16 | NRŌLR2126SCZZ | AM | | C | Transfer roller 1 |
| 17 | PGLSZ2019SCZZ | AH | | B | Cover glass |
| 18 | DUNTK3993SCZZ | CP | | E | Image sensor unit |
| 19 | QCNW-2810SCZZ | AM | | C | Image sensor cable |
| 20 | PSHEZ2282SCZZ | AC | | C | Sheet,cable |
| 21 | LBŌS-2011SCZZ | AD | | C | Boss |
| 22 | LFRM-2076SCZZ | AV | | C | Sub frame |
| 23 | LANGT2638SCZZ | AC | | C | Angle,sub frame (Right) |
| 24 | MSPRP2210SCZZ | AD | | C | Spring |
| 25 | NGERH2065SCZZ | AC | | C | Transfer gear 2 |
| 26 | NRŌLR2127SCZZ | AM | | C | Transfer roller 2 |
| 27 | LPLTM2287SCZZ | AG | | C | Exit plate |
| 28 | QCNW-2827SCZZ | AB | | C | Earth wire |
| 29 | LANGT2639SCZZ | AC | | C | Angle (Left) |
| 30 | PSHEZ2291SCZZ | AA | | C | Protector sheet,cable |
| 31 | PTPEZ2011SCZZ | AA | | C | Head tape |
| 32 | QCNW-2802SCZZ | AP | | C | Head cable |
| 33 | QCNW-2801SCZZ | AV | | C | Head signal cable |
| 34 | PHEDZ2026SCZZ | CC | | B | Thermal head |
| 35 | LPLTM2277SCZZ | AG | | C | Head cover |
| 36 | NGERH2070SCZZ | AC | | C | Gear |
| 37 | NGERH2061SCZZ | AC | | C | Gear |
| 38 | NGERH2060SCZZ | AC | | C | Reduction gear |
| 39 | NGERH2062SCZZ | AC | | C | Gear |
| 40 | LPLTM2284SCZZ | AP | | C | Plate,transmit motor |
| 41 | CMŌTZ2039SC01 | BD | | E | Transmit motor |
| 42 | TLABH2403SCZZ | AA | | C | Caution label |
| 43 | QCNW-5097SCZZ | AB | | C | Earth wire |
| 44 | PWiR-2005SCZZ | AD | | C | Spring,transmit release |
| 45 | TLABS2347SCZZ | AB | | C | Caution label |
| 46 | LHLDW2020SCZZ | AB | | C | Holder,wire |

FO200D1

6 Sub-Frame unit



## 7 Operation unit

| NO. | PARTS CODE | PRICE RANK | NEW MARK | PART RANK | DESCRIPTION |
|---|---|---|---|---|---|
| 1 | 00P01KH311B-3 | AV | | D | Case |
| 2 | 00P03KH80A/// | AV | | C | Face plate |
| 3 | 00PSKHCAM0001 | AG | | B | Tact switch |
| 4 | 00P29KH244A// | AG | | C | Harness (5pin) |
| 5 | 00P24KH284A// | AD | | C | Spacer,LCD |
| 6 | 00P12KH317B// | AX | | C | PWB w/o parts |
| 7 | 00PLUD7A1135A | BF | | B | LCD |
| 8 | 00P3A131050// | AB | | C | Screw |
| | (Unit) | | | | |
| 901 | DUNTK4112SCZZ | BK | | E | Operation unit |

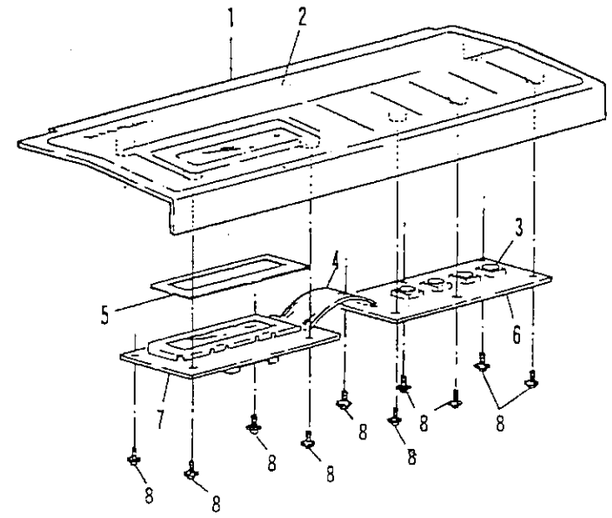
## 8 Packing material & Accessories

| NO. | PARTS CODE | PRICE RANK | NEW MARK | PART RANK | DESCRIPTION |
|---|---|---|---|---|---|
| 1 | TiNSE2150SCZZ | BD | N | D | Instruction book (English) |
| | TiNSG2151SCZZ | BD | N | D | Instruction book (Germany) |
| 4 | SPAKA2625SCZZ | AH | | D | Packing add (Left) |
| ⚠5 | CCNW-2487SC01 | AW | | B | AC cord |
| 8 | SPAKA2591SCZZ | AC | | D | Packing add |
| 9 | PGiDH2189SCZZ | AE | | C | Hopper sub guide |
| 10 | SPAKA2624SCZZ | AH | | D | Packing add (Right) |
| 11 | SPAKC2626SCZZ | AM | | D | Packing case |
| 12 | UBNDA1008CCZZ | AA | | C | AC.Cord band |
| 101 | CSHEZ2281SC01 | AQ | | C | Carrier sheet |

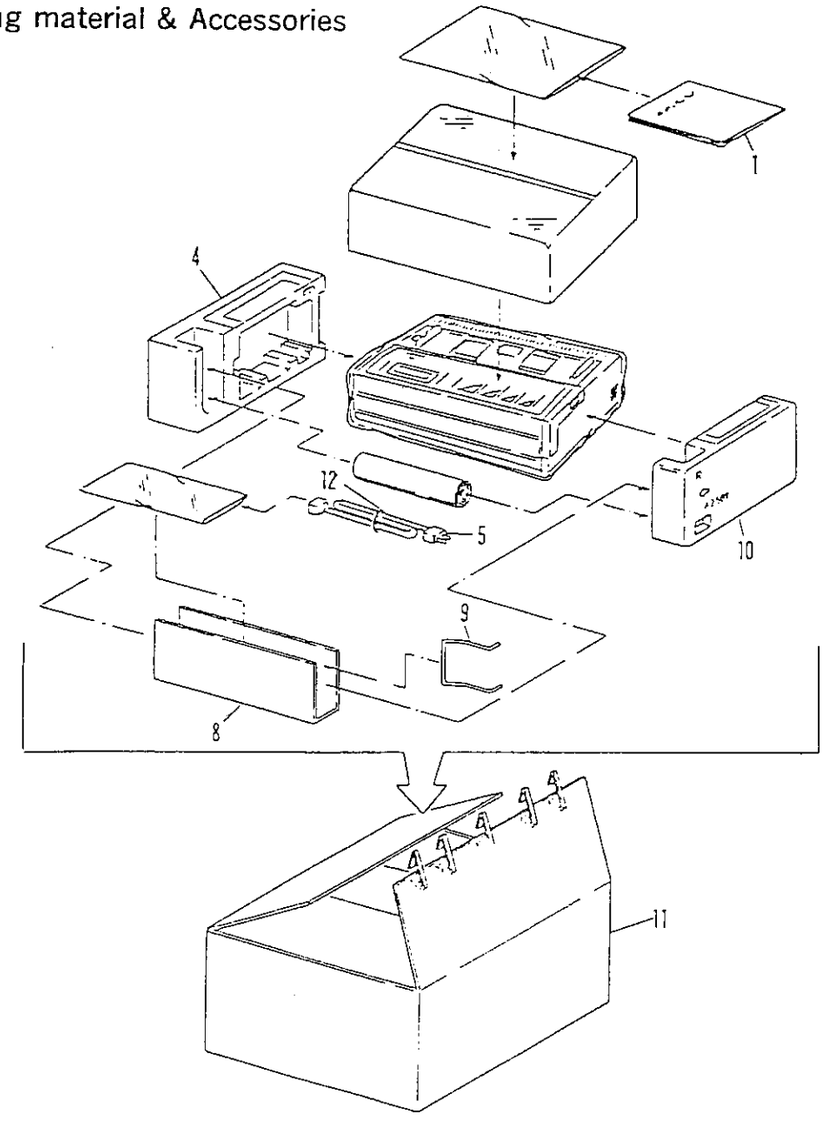


FO200D1

## 7 Operation unit




## 8 Packing material & Accessories



## 9 Control board

| NO. | PARTS CODE | PRICE RANK | NEW MARK | PART RANK | DESCRIPTION | |
|---|---|---|---|---|---|---|
| 1 | UBATN2319RCZZ | AV | | B | Battery (LIBAT750MAH) | [BATT] |
| 2 | RMPTC4472QCKB | AB | | B | Block resistor (4.7KΩ×4 1/8W ±10%) | [BR1] |
| 3 | RMPTC4472QCKB | AB | | B | Block resistor (4.7KΩ×4 1/8W ±10%) | [BR3] |
| 4 | RMPTC4472QCKB | AB | | B | Block resistor (4.7KΩ×4 1/8W ±10%) | [BR4] |
| 5 | RMPTC4472QCKB | AB | | B | Block resistor (4.7KΩ×4 1/8W ±10%) | [BR5] |
| 6 | RMPTC8103QCKB | AD | | B | Block resis (10KΩ×8 1/8W ±10%) | [BR6] |
| 7 | RMPTC4472QCKB | AB | | B | Block resis (4.7KΩ×4 1/8W ±10%) | [BR7] |
| 8 | RMPTC8103QCKB | AD | | B | Block resistor (10KΩ×8 1/8W ±10%) | [BR8] |
| 9 | RMPTC4103QCKB | AC | | B | Block resistor (10KΩ×4 1/8W ±10%) | [BR9] |
| 10 | RMPTC8103QCKB | AD | | B | Block resistor (10KΩ×8 1/8W ±10%) | [BR10] |
| 11 | RMPTC8103QCKB | AD | | B | Block resistor (10KΩ×8 1/8W ±10%) | [BR11] |
| 12 | RALMB2008SCZZ | AG | | B | Buzzer | [BZ] |
| 13 | VCKYPU1HF223Z | AA | | C | Capacitor (50WV 0.022μF) | [C1] |
| 14 | VCKYPU1HF223Z | AA | | C | Capacitor (50WV 0.022μF) | [C3] |
| 15 | VCQYKU1HM102K | AA | | C | Capacitor (50WV 1000pF) | [C4] |
| 16 | VCSAVU1EE106M | AD | | C | Capacitor (25WV 10μF) | [C5] |
| 17 | VCKYPU1HB222K | AA | | C | Capacitor (50WV 2200pF) | [C6] |
| 18 | VCKYPU1HB222K | AA | | C | Capacitor (50WV 2200pF) | [C7] |
| 19 | VCKYPU1HB222K | AA | | C | Capacitor (50WV 2200pF) | [C8] |
| 20 | VCKYPU1HF223Z | AA | | C | Capacitor (50WV 0.022μF) | [C9] |
| 21 | VCKYPU1HB222K | AA | | C | Capacitor (50WV 2200pF) | [C10] |
| 22 | VCKYPU1HB102K | AA | | C | Capacitor (50WV 1000pF) | [C11] |
| 23 | VCKYPU1HF223Z | AA | | C | Capacitor (50WV 0.022μF) | [C12] |
| 24 | VCSAVU1CE106M | AC | | C | Capacitor (16WV 10μF) | [C13] |
| 25 | VCCCPU1HH270J | AA | | C | Capacitor (50WV 27pF) | [C14] |
| 26 | RC-KZ1018CCZZ | AE | | C | Capacitor (250WV 25pF) | [C15] |
| 27 | VCKYPU1HF223Z | AA | | C | Capacitor (50WV 0.022μF) | [C16] |
| 28 | VCKYPU1HB102K | AA | | C | Capacitor (50WV 1000pF) | [C17] |
| 29 | VCKYPU1HF223Z | AA | | C | Capacitor (50WV 0.022μF) | [C18] |
| 30 | VCSAVA1AE336M | AD | | C | Capacitor (10WV 33μF) | [C19] |
| 31 | VCSAVU1EE106M | AD | | C | Capacitor (25WV 10μF) | [C20] |
| 32 | VCKYPU1HF223Z | AA | | C | Capacitor (50WV 0.022μF) | [C21] |
| 33 | VCKYPU1HB102K | AA | | C | Capacitor (50WV 1000pF) | [C22] |
| 34 | VCKYPU1HF223Z | AA | | C | Capacitor (50WV 0.022μF) | [C23] |
| 35 | VCKYPU1HF223Z | AA | | C | Capacitor (50WV 0.022μF) | [C24] |
| 36 | VCSAVU1EE106M | AD | | C | Capacitor (25WV 10μF) | [C25] |
| 37 | VCKYPU1HF223Z | AA | | C | Capacitor (50WV 0.022μF) | [C26] |
| 38 | VCKYPU1HF223Z | AA | | C | Capacitor (50WV 0.022μF) | [C27] |
| 39 | VCKYPU1HB222K | AA | | C | Capacitor (50WV 2200pF) | [C28] |
| 40 | VCKYPU1HF223Z | AA | | C | Capacitor (50WV 0.022μF) | [C29] |
| 41 | VCSAVU1EE106M | AD | | C | Capacitor (25WV 10μF) | [C31] |
| 42 | VCKYPU1HF223Z | AA | | C | Capacitor (50WV 0.022μF) | [C32] |
| 43 | VCSATU1EE106M | AE | | C | Capacitor (25WV 10μF) | [C33] |
| 44 | VCKYPU1HF223Z | AA | | C | Capacitor (50WV 0.022μF) | [C34] |
| 45 | VCKYPU1HF223Z | AA | | C | Capacitor (50WV 0.022μF) | [C35] |
| 46 | VCKYPU1HF223Z | AA | | C | Capacitor (50WV 0.022μF) | [C36] |
| 47 | VCKYPU1HF223Z | AA | | C | Capacitor (50WV 0.022μF) | [C37] |
| 48 | VCKYPU1HF223Z | AA | | C | Capacitor (50WV 0.022μF) | [C38] |
| 49 | VCSAVA1AE336M | AD | | C | Capacitor (10WV 33μF) | [C39] |
| 50 | VCKYPU1HF223Z | AA | | C | Capacitor (50WV 0.022μF) | [C40] |
| 51 | VCSAVU1EE106M | AD | | C | Capacitor (25WV 10μF) | [C41] |
| 53 | VCKYPU1HB222K | AA | | C | Capacitor (50WV 2200pF) | [C42] |
| 54 | VCKYPU1HB222K | AA | | C | Capacitor (50WV 2200pF) | [C43] |
| 55 | VCKYPU1HB222K | AA | | C | Capacitor (50WV 2200pF) | [C44] |
| 56 | VCKYPU1HB222K | AA | | C | Capacitor (50WV 2200pF) | [C45] |
| 57 | VCKYPU1HF223Z | AA | | C | Capacitor (50WV 0.022μF) | [C101] |
| 58 | VCKYPU1HF223Z | AA | | C | Capacitor (50WV 0.022μF) | [C102] |
| 60 | VCKYPU1HF223Z | AA | | C | Capacitor (50WV 0.022μF) | [C104] |
| 61 | VCKYPU1HF223Z | AA | | C | Capacitor (50WV 0.022μF) | [C106] |
| 62 | VCKYPU1HF223Z | AA | | C | Capacitor (50WV 0.022μF) | [C107] |
| 63 | VCKYPU1HF223Z | AA | | C | Capacitor (50WV 0.022μF) | [C108] |
| 64 | VCQYKU1HM333K | AB | | C | Capacitor (50WV 0.033μF) | [C109] |
| 65 | VCKYPU1HF223Z | AA | | C | Capacitor (50WV 0.022μF) | [C110] |
| 66 | VCKYPU1HF223Z | AA | | C | Capacitor (50WV 0.022μF) | [C111] |
| 67 | QCNCM2350SC9F | AR | | C | Connector (96pin) | [CNA] |
| 68 | QCNCW2356SC1B | AK | | C | Connector (12pin) | [CNB] |
| 69 | QCNCM2356SC1B | AL | | C | Connector (12pin) | [CNC] |
| 70 | QCNCM2353SC0 | AB | | C | Connector (9pin) | [CNFSN] |
| 71 | QCNCM2354SC1B | AG | | C | Connector (12pin) | [CNIS] |
| 72 | QCNCM2502RC4J | AK | | C | Connector (40pin) | [CNM] |
| 73 | QCNCM2353SC0F | AB | | C | Connector (6pin) | [CNPSN] |
| 74 | QCNCM2351SC2F | AH | | C | Connector (26pin) | [CNTHS] |
| 75 | VHDDSS133//-1 | AA | | B | Diode (DSS133) | [D1] |
| 76 | VHDDSS133//-1 | AA | | B | Diode (DSS133) | [D2] |
| 77 | VHDDSS133HV-1 | AA | | B | Diode (DSS133HV) | [D7] |
| 78 | VHDDSS133HV-1 | AA | | B | Diode (DSS133HV) | [D8] |
| 79 | VHDDSS133HV-1 | AA | | B | Diode (DSS133HV) | [D9] |
| 80 | VHERD4.7E2/-1 | AB | | B | Zener diode (RD4.7E2) | [D10] |
| 81 | RH-DX2006SCZZ | AF | | B | Diode (DCIA) | [DA1] |
| 82 | RH-DX2006SCZZ | AF | | B | Diode (DCIA) | [DA2] |

## 9 Control board

| NO. | PARTS CODE | PRICE RANK | NEW MARK | PART RANK | DESCRIPTION | |
|---|---|---|---|---|---|---|
| 83 | VHiTC74HC244F | AM | | B | IC (TC74HC244F) | [IC1] |
| 84 | VHiTMPZ84C43F | BA | | B | IC (TMPZ84C43F) | [IC2] |
| 85 | VHiT241282023 | AT | | B | IC (T241282023) | [IC3] |
| 86 | VHiTC74HC367F | AG | | B | IC (TC74HC367F) | [IC4] |
| 87 | VHiTC74HC367F | AG | | B | IC (TC74HC367F) | [IC5] |
| 88 | VHiTMM2015AP1 | AQ | | B | IC (TMM2015AP1) | [IC6] |
| 89 | VHiLZ92F33/-1 | AY | | B | IC (LZ92F33) | [IC7] |
| 90 | VHiTC74HC125F | AH | | B | IC (TC74HC125F) | [IC8] |
| 91 | VHiTC74HC08FN | AD | | B | IC (TC74HC08FN) | [IC9] |
| 92 | VHiTC74HC74FN | AF | | B | IC (TC74HC74FN) | [IC10] |
| 93 | VHiHD46304/-1 | BH | | B | IC (HD46304) | [IC11] |
| 94 | VHiTL084CN/-F | AN | | B | IC (TL084CN) | [IC12] |
| 95 | VHiUPD4066BG1 | AF | | B | IC (UPD4066BG1) | [IC13] |
| 96 | VHiHA19203MPN | AU | | B | IC (HA19203MPN) | [IC14] |
| 97 | VHiTC74HC138F | AL | | B | IC (TC74HC138F) | [IC15] |
| 98 | VHiTL084CN/-F | AN | | B | IC (TL084CN) | [IC16] |
| 99 | VHiTMPZ84C10P | AZ | | B | IC (TMPZ84C10P) | [IC18] |
| 100 | VHiTC74HC74FN | AF | | B | IC (TC74HC74FN) | [IC19] |
| 101 | VHiTC74HC138F | AL | | B | IC (TC74HC138F) | [IC20] |
| 102 | VHiTC74HC138F | AL | | B | IC (TC74HC138F) | [IC21] |
| 103 | VHiM5M82C55-1 | AS | | B | IC (M5M82C55) | [IC22] |
| 104 | VHiMS82C53GSV | AR | | B | IC (MS82C53GSV) | [IC23] |
| 105 | VHiM5M82C55-1 | AS | | B | IC (M5M82C55) | [IC24] |
| 106 | VHiMS82C53GSV | AR | | B | IC (MS82C53GSV) | [IC25] |
| 107 | VHiM5M82C55-1 | AS | | B | IC (M5M82C55) | [IC26] |
| 108 | VHiMS82C53GSV | AR | | B | IC (MS82C53GSV) | [IC27] |
| 109 | VHiM5M82C55-1 | AS | | B | IC (M5M82C55) | [IC28] |
| 110 | VHiTC74HC245F | AM | | B | IC (TC74HC245F) | [IC29] |
| 111 | VHiTMPZ84C00P | AZ | | B | IC (TMPZ84C00P) | [IC30] |
| 112 | VHi27128FCK0E | BK | N | B | IC (27128FCK0E) | [IC31] [Germany] |
| | VHi27128FDH0A | BK | N | B | IC (27128FDH0A) | [IC31] [Other countries] |
| 113 | VHiTC74HC04FN | AD | | B | IC (TC74HC04FN) | [IC32] |
| 114 | VHi27256FAM1F | BM | N | B | IC (27256FAM1F) | [IC33] [Germany] |
| | VHi27256FBF1A | BM | N | B | IC (27256FBF1A) | [IC33] [Other countries] |
| 115 | VHiTC74HC32FN | AE | | B | IC (TC74HC32FN) | [IC34] |
| 116 | VHiTC74HC02FN | AD | | B | IC (TC74HC02FN) | [IC35] |
| 117 | VHi27256FAM0F | BM | N | B | IC (27256FAM0F) | [IC36] [Germany] |
| | VHi27256FBZ0A | BM | N | B | IC (27256FBZ0A) | [IC36] [Holland] |
| | VHi27256FBF0A | BM | N | B | IC (27256FBF0A) | [IC36] [Other countries] |
| 118 | VHiTC74HC00FN | AD | | B | IC (TC74HC00FN) | [IC37] |
| 119 | VHiTC74HC139F | AH | | B | IC (TC74HC139F) | [IC38] |
| 120 | VHiLH236769-1 | AN | | B | IC (LH236769) | [IC39] |
| 121 | VHiTC74HC04FN | AD | | B | IC (TC74HC04FN) | [IC40] |
| 122 | VHiTC74HC14FN | AH | | B | IC (TC74HC14FN) | [IC41] |
| 123 | VHiM53204P/-1 | AF | | B | IC (M53204P) | [IC42] |
| 124 | VHiLZ92E33/-1 | AX | | B | IC (LZ92E33) | [IC43] |
| 125 | VHi74LS92//-F | AF | | B | IC (74LS92) | [IC44] |
| 126 | VHiUPD8049941 | AT | | B | IC (UPD8049941) | [IC45] |
| 127 | VHiT3985///-1 | BA | | B | IC (T3985) | [IC46] |
| 128 | VHiHM6147LP-1 | AX | | B | IC (HM6147LP) | [IC47] |
| 129 | VHiMS82C43GSV | AR | | B | IC (MS82C43GSV) | [IC48] |
| 130 | VHiTC74HC04FN | AD | | B | IC (TC74HC04FN) | [IC49] |
| 131 | VHiTC74HC123F | AH | | B | IC (TC74HC123F) | [IC50] |
| 132 | VHiHM6147LP-1 | AX | | B | IC (HM6147LP) | [IC51] |
| 133 | VHiM53206P/-1 | AF | | B | IC (M53206P) | [IC52] |
| 134 | VHiTC74HC00FN | AD | | B | IC (TC74HC00FN) | [IC53] |
| 135 | VHiTC74HC08FN | AD | | B | IC (TC74HC08FN) | [IC54] |
| 136 | VHiTC74HC04FN | AD | | B | IC (TC74HC04FN) | [IC55] |
| 137 | VHiTC74HC02FN | AD | | B | IC (TC74HC02FN) | [IC56] |
| 138 | VHiTC74HC174F | AH | | B | IC (TC74HC174F) | [IC57] |
| 139 | VHiMSM6242RS1 | AV | | B | IC (MSM6242RS1) | [IC58] |
| 140 | VHi8749/FBB1B | BP | N | B | IC (8749/FBB1B) | [IC59] |
| 141 | VHiTC74HC14FN | AH | | B | IC (TC74HC14FN) | [IC60] |
| 142 | VHiHM6264AL15 | AW | | B | IC (HM6264AL15) | [IC61] |
| 143 | VHiHM6264AL15 | AW | | B | IC (HM6264AL15) | [IC62] |
| 144 | VHiiR2339//-1 | AG | | B | IC (IR2339) | [IC63] |
| 145 | VHiTC74HC374F | AL | | B | IC (TC74HC374F) | [IC64] |
| 146 | VHiSTA403A/-1 | AL | | B | IC (STA403A) | [IC65] |
| 147 | VHiSTA403A/-1 | AL | | B | IC (STA403A) | [IC66] |
| 148 | VHiM53204P/-1 | AF | | B | IC (M53204P) | [IC67] |
| 149 | VHiTC74HC02FN | AD | | B | IC (TC74HC02FN) | [IC68] |
| 150 | VRD-RC2EY103J | AA | | C | Resistor (1/4W 10KΩ ±5%) | [R1] |
| 151 | VRD-RC2EY332J | AA | | C | Resistor (1/4W 3.3KΩ ±5%) | [R2A] |
| 152 | VRD-RC2EY101J | AA | | C | Resistor (1/4W 100Ω ±5%) | [R2] |
| 153 | VRD-RC2EY562J | AA | | C | Resistor (1/4W 5.6KΩ ±5%) | [R3] |
| 154 | VRD-RC2EY102J | AA | | C | Resistor (1/4W 1KΩ ±5%) | [R4] |
| 155 | VRD-RC2EY103J | AA | | C | Resistor (1/4W 10KΩ ±5%) | [R5A] |
| 156 | VRD-RC2EY152J | AA | | C | Resistor (1/4W 1.5KΩ ±5%) | [R7] |
| 157 | VRD-ST2EY000J | AA | | C | Resistor (1/4W 0Ω ±5%) | [R11] |
| 158 | VRD-RC2EY222J | AA | | C | Resistor (1/4W 2.2KΩ ±5%) | [R12] |

## 9 Control board

| NO. | PARTS CODE | PRICE RANK | NEW MARK | PART RANK | DESCRIPTION | |
|---|---|---|---|---|---|---|
| 159 | VRD-RC2EY471J | AA | | C | Resistor (1/4W 470Ω ±5%) | [R13] |
| 160 | VRD-RC2EY331J | AA | | C | Resistor (1/4W 330Ω ±5%) | [R14] |
| 161 | VRD-RC2EY102J | AA | | C | Resistor (1/4W 1KΩ ±5%) | [R15] |
| 162 | VRNRC2EK3321F | AA | | C | Resistor (1/4W 3.32KΩ ±1%) | [R16] |
| 163 | VRNRC2EK4700F | AA | | C | Resistor (1/4W 470Ω ±1%) | [R17] |
| 164 | VRNRC2EK1052F | AA | | C | Resistor (1/4W 10.5KΩ ±1%) | [R18] |
| 165 | VRNRC2EK1052F | AA | | C | Resistor (1/4W 10.5KΩ ±1%) | [R19] |
| 166 | VRNRC2EK1021F | AA | | C | Resistor (1/4W 1.02KΩ ±1%) | [R20] |
| 167 | VRNRC2EK1021F | AA | | C | Resistor (1/4W 1.02KΩ ±1%) | [R21] |
| 168 | VRNRC2EK1052F | AA | | C | Resistor (1/4W 10.5KΩ ±1%) | [R22] |
| 169 | VRNRC2EK1052F | AA | | C | Resistor (1/4W 10.5KΩ ±1%) | [R23] |
| 170 | VRNRC2EK1021F | AA | | C | Resistor (1/4W 1.02KΩ ±1%) | [R24] |
| 171 | VRNRC2EK1021F | AA | | C | Resistor (1/4W 1.02KΩ ±1%) | [R25] |
| 172 | VRNRC2EK1052F | AA | | C | Resistor (1/4W 10.5KΩ ±1%) | [R26] |
| 173 | VRNRC2EK1052F | AA | | C | Resistor (1/4W 10.5KΩ ±1%) | [R30] |
| 174 | VRD-RC2EY472J | AA | | C | Resistor (1/4W 4.7KΩ ±5%) | [R31A] |
| 175 | VRD-RC2EY472J | AA | | C | Resistor (1/4W 4.7KΩ ±5%) | [R31] |
| 176 | VRD-RC2EY472J | AA | | C | Resistor (1/4W 4.7KΩ ±5%) | [R32] |
| 177 | VRD-RC2EY472J | AA | | C | Resistor (1/4W 4.7KΩ ±5%) | [R33] |
| 178 | VRD-RC2EY472J | AA | | C | Resistor (1/4W 4.7KΩ ±5%) | [R34] |
| 179 | VRD-RC2EY472J | AA | | C | Resistor (1/4W 4.7KΩ ±5%) | [R35] |
| 180 | VRD-RC2EY103J | AA | | C | Resistor (1/4W 10KΩ ±5%) | [R36] |
| 181 | VRD-RC2EY471J | AA | | C | Resistor (1/4W 470Ω ±5%) | [R37] |
| 182 | VRD-RC2EY102J | AA | | C | Resistor (1/4W 1KΩ ±5%) | [R38] |
| 183 | VRD-RC2EY103J | AA | | C | Resistor (1/4W 10KΩ ±5%) | [R40] |
| 184 | VRD-RC2EY471J | AA | | C | Resistor (1/4W 470Ω ±5%) | [R41] |
| 185 | VRD-RC2EY471J | AA | | C | Resistor (1/4W 470Ω ±5%) | [R42] |
| 186 | VRD-RC2EY101J | AA | | C | Resistor (1/4W 100Ω ±5%) | [R43] |
| 187 | VRD-RC2EY103J | AA | | C | Resistor (1/4W 10KΩ ±5%) | [R44] |
| 188 | VRD-RC2EY103J | AA | | C | Resistor (1/4W 10KΩ ±5%) | [R45] |
| 189 | VRD-RC2EY103J | AA | | C | Resistor (1/4W 10KΩ ±5%) | [R46] |
| 190 | VRD-RC2EY332J | AA | | C | Resistor (1/4W 3.3KΩ ±5%) | [R47] |
| 191 | VRD-RC2EY562J | AA | | C | Resistor (1/4W 5.6KΩ ±5%) | [R48] |
| 192 | VRD-RC2EY102J | AA | | C | Resistor (1/4W 1KΩ ±5%) | [R49] |
| 193 | VRD-RC2EY102J | AA | | C | Resistor (1/4W 1KΩ ±5%) | [R50] |
| 194 | VRD-RC2EY102J | AA | | C | Resistor (1/4W 1KΩ ±5%) | [R52] |
| 195 | VRD-RC2EY472J | AA | | C | Resistor (1/4W 4.7KΩ ±5%) | [R54] |
| 196 | VRD-RC2EY330J | AA | | C | Resistor (1/4W 33Ω ±5%) | [R55] |
| 197 | VRD-RC2EY103J | AA | | C | Resistor (1/4W 10KΩ ±5%) | [R56] |
| 198 | VRD-RC2EY104J | AA | | C | Resistor (1/4W 100KΩ ±5%) | [R57] |
| 199 | VRD-RC2EY104J | AA | | C | Resistor (1/4W 100KΩ ±5%) | [R58] |
| 200 | VRD-RC2EY102J | AA | | C | Resistor (1/4W 1KΩ ±5%) | [R59] |
| 201 | VRD-RC2EY103J | AA | | C | Resistor (1/4W 10KΩ ±5%) | [R60] |
| 202 | VRD-RC2EY103J | AA | | C | Resistor (1/4W 10KΩ ±5%) | [R61] |
| 203 | VRD-RC2EY103J | AA | | C | Resistor (1/4W 10KΩ ±5%) | [R62] |
| 204 | VRD-RC2EY102J | AA | | C | Resistor (1/4W 1KΩ ±5%) | [R63] |
| 205 | VRD-RC2EY103J | AA | | C | Resistor (1/4W 10KΩ ±5%) | [R64] |
| 206 | VRD-RC2EY103J | AA | | C | Resistor (1/4W 10KΩ ±5%) | [R65] |
| 207 | VRD-RC2EY471J | AA | | C | Resistor (1/4W 470Ω ±5%) | [R66] |
| 208 | VRD-RC2EY103J | AA | | C | Resistor (1/4W 10KΩ ±5%) | [R67] |
| 209 | VRD-RC2EY471J | AA | | C | Resistor (1/4W 470Ω ±5%) | [R68] |
| 210 | VRD-RC2EY331J | AA | | C | Resistor (1/4W 330Ω ±5%) | [R69] |
| 211 | VRD-RC2EY472J | AA | | C | Resistor (1/4W 4.7KΩ ±5%) | [R71] |
| 212 | VRD-RC2EY103J | AA | | C | Resistor (1/4W 10KΩ ±5%) | [R72] |
| 213 | VRD-RC2EY472J | AA | | C | Resistor (1/4W 4.7KΩ ±5%) | [R73] |
| 214 | VRD-RC2EY472J | AA | | C | Resistor (1/4W 4.7KΩ ±5%) | [R74] |
| 215 | VRD-RC2EY103J | AA | | C | Resistor (1/4W 10KΩ ±5%) | [R75] |
| 216 | VRD-RC2EY471J | AA | | C | Resistor (1/4W 470Ω ±5%) | [R76] |
| 217 | VRD-RC2EY472J | AA | | C | Resistor (1/4W 4.7KΩ ±5%) | [R77] |
| 218 | VRD-RC2EY472J | AA | | C | Resistor (1/4W 4.7KΩ ±5%) | [R78] |
| 219 | VRD-RC2EY103J | AA | | C | Resistor (1/4W 10KΩ ±5%) | [R79] |
| 220 | VRD-RC2EY470J | AA | | C | Resistor (1/4W 47Ω ±5%) | [R80] |
| 221 | VRD-RC2EY103J | AA | | C | Resistor (1/4W 10KΩ ±5%) | [R81] |
| 222 | VRD-RC2EY472J | AA | | C | Resistor (1/4W 4.7KΩ ±5%) | [R82] |
| 223 | VRD-HT2HY151J | AA | | C | Resistor (1/2W 150Ω ±5%) | [R83] |
| 224 | VRD-RC2EY472J | AA | | C | Resistor (1/4W 4.7KΩ ±5%) | [R84] |
| 225 | VRD-RC2EY102J | AA | | C | Resistor (1/4W 1KΩ ±5%) | [R85] |
| 226 | VRD-RC2EY102J | AA | | C | Resistor (1/4W 1KΩ ±5%) | [R86] |
| 227 | VRD-RC2EY222J | AA | | C | Resistor (1/4W 2.2KΩ ±5%) | [R87] |
| 228 | VRD-RC2EY102J | AA | | C | Resistor (1/4W 1KΩ ±5%) | [R89] |
| 229 | VRD-RC2EY222J | AA | | C | Resistor (1/4W 2.2KΩ ±5%) | [R91] |
| 230 | VRD-RC2EY473J | AA | | C | Resistor (1/4W 47KΩ ±5%) | [R92] |
| 231 | VRD-RC2EY473J | AA | | C | Resistor (1/4W 47KΩ ±5%) | [R93] |
| 232 | VRD-RC2EY682J | AA | | C | Resistor (1/4W 6.8KΩ ±5%) | [R94] |
| 233 | VRD-RC2EY332J | AA | | C | Resistor (1/4W 3.3KΩ ±5%) | [R95] |
| 234 | VRD-RC2EY471J | AA | | C | Resistor (1/4W 470Ω ±5%) | [R96] |
| 235 | VRD-RC2EY471J | AA | | C | Resistor (1/4W 470Ω ±5%) | [R97] |
| 236 | VRD-RC2EY471J | AA | | C | Resistor (1/4W 470Ω ±5%) | [R98] |
| 237 | VRD-RC2EY471J | AA | | C | Resistor (1/4W 470Ω ±5%) | [R99] |
| 238 | VRD-RC2EY471J | AA | | C | Resistor (1/4W 470Ω ±5%) | [R100] |

## 9 Control board

| NO. | PARTS CODE | PRICE RANK | NEW MARK | PART RANK | DESCRIPTION | |
|---|---|---|---|---|---|---|
| 239 | VRD-RC2EY471J | AA | | C | Resistor (1/4W 470Ω ±5%) | [R101] |
| 240 | VRD-RC2EY471J | AA | | C | Resistor (1/4W 470Ω ±5%) | [R102] |
| 241 | VRD-RC2EY471J | AA | | C | Resistor (1/4W 470Ω ±5%) | [R103] |
| 242 | VRD-HT2HY392J | AA | | C | Resistor (1/2W 3.9KΩ ±5%) | [R104] |
| 243 | VRD-HT2HY392J | AA | | C | Resistor (1/2W 3.9KΩ ±5%) | [R105] |
| 244 | VRD-HT2HY392J | AA | | C | Resistor (1/2W 3.9KΩ ±5%) | [R106] |
| 245 | VRD-HT2HY392J | AA | | C | Resistor (1/2W 3.9KΩ ±5%) | [R107] |
| 246 | VRD-RC2EY221J | AA | | C | Resistor (1/4W 220Ω ±5%) | [R108] |
| 247 | VRD-RC2EY103J | AA | | C | Resistor (1/4W 10KΩ ±5%) | [R109] |
| 248 | VRD-RC2EY103J | AA | | C | Resistor (1/4W 10KΩ ±5%) | [R110] |
| 249 | VRD-RC2EY221J | AA | | C | Resistor (1/4W 220Ω ±5%) | [R112] |
| 250 | VRD-RC2EY472J | AA | | C | Resistor (1/4W 4.7KΩ ±5%) | [R113] |
| 251 | VRD-RC2EY472J | AA | | C | Resistor (1/4W 4.7KΩ ±5%) | [R114] |
| 252 | VRD-RC2EY221J | AA | | C | Resistor (1/4W 220Ω ±5%) | [R115] |
| 253 | VRD-RC2EY103J | AA | | C | Resistor (1/4W 10KΩ ±5%) | [R116] |
| 254 | QSW-S1359CCZZ | AD | | B | Switch | [SW1] |
| 255 | QSW-Z2115SCZZ | AL | | B | Dip switch | [SW2] |
| 256 | QSW-Z1067HCZZ | AF | | B | Dip switch (51D-0401Dip) | [SW3] |
| 257 | VRD-ST2EY000J | AA | | C | Resistor (1/4W 0Ω ±5%) | [TP1] |
| 258 | VRD-ST2EY000J | AA | | C | Resistor (1/4W 0Ω ±5%) | [TP2] |
| 259 | VRD-ST2EY000J | AA | | C | Resistor (1/4W 0Ω ±5%) | [TP3] |
| 260 | VRD-ST2EY000J | AA | | C | Resistor (1/4W 0Ω ±5%) | [TP4] |
| 261 | VRD-ST2EY000J | AA | | C | Resistor (1/4W 0Ω ±5%) | [TP5] |
| 262 | VRD-ST2EY000J | AA | | C | Resistor (1/4W 0Ω ±5%) | [TP6] |
| 263 | VRD-ST2EY000J | AA | | C | Resistor (1/4W 0Ω ±5%) | [TP7] |
| 264 | VS2SC1214-C-1 | AE | | B | Transistor (2SC1214C) | [TR1] |
| 265 | VHiPST520C-2/ | AK | | B | IC (PST520C-2) | [TR2] |
| 266 | VS2SA673-C/-1 | AE | | B | Transistor (2SA673-C) | [TR3] |
| 267 | RVR-MD211QCN1 | AD | | B | Variable resistor (470Ω) | [VR1] |
| 268 | RCRSQ2038SCZZ | AR | | B | Crystal (8MHz) | [XTAL1] |
| 269 | RCRSQ2007SCZZ | AL | | B | Crystal (32.768KHz) | [XTAL2] |
| 270 | RCRSQ2037SCZZ | AY | | B | Crystal (9.95328MHz) | [XTAL3] |
| 271 | QSOCZ6428ACZZ | AE | | C | Socket (28pin) | |
| 272 | QSOCZ6440ACZZ | AG | | C | Socket (40pin) | |
| 273 | VCSAVU1AE336M | AD | | C | Capacitor (10WV 33μF) | |
| | (Unit) | | | | | |
| 901 | DUNTK3891SCZZ | CV | N | E | Control board | [Germany] |
| | DUNTK4820SCZZ | CV | N | E | Control board | [Other countries] |
| 902 | DUNTK3987SCZZ | CD | | E | Modem unit | |

## 10 Power supply unit

| NO. | PARTS CODE | PRICE RANK | NEW MARK | PART RANK | DESCRIPTION | |
|---|---|---|---|---|---|---|
| ⚠ 1 | 0CB130820007/ | AY | | B | Transformer (ST-P21) | [T1] |
| ⚠ 2 | 0CB129820042/ | AQ | | B | Transformer (DT-P12) | [T2,3] |
| ⚠ 3 | 0CB129820043/ | AZ | | B | Transformer (PT-P17) | [T4] |
| 4 | 0CBUKZ0072ZZ/ | AY | | C | Choke coil (SC-02-300JV) | [L1] |
| 5 | 0CBUKZ0099ZZ/ | AR | | C | Choke coil (SN12-1H03) | [L2,3] |
| 6 | 0CBUKZ0111ZZ/ | AP | | C | Choke coil (SE25V-15100) | [L4] |
| 7 | 0CBUKZ0065ZZ/ | AH | | C | Choke coil (SBC-060-302) | [L5] |
| 8 | 0CB129820044/ | AX | | C | Choke coil (CH-107) | [L6] |
| 9 | 0CBBHZ0011ZZ/ | AR | | C | Choke coil (ESD-R-19) | [L7] |
| 10 | 0CBUCH0046ZZ/ | AW | | B | IC (ZHMA3058) | [IC1] |
| 11 | 0CBUCB0013AZ/ | AH | | B | IC (AN78N12) | [IC2] |
| 12 | 0CBUCB0018AZ/ | AH | | B | IC (AN79N12) | [IC3] |
| 13 | 0CBUCZ0097ZZ/ | AG | | B | IC (M5237L) | [IC4] |
| 14 | 0CBUCZ0134ZZ/ | AH | | B | IC (L5431) | [IC5] |
| 15 | 0CBUAC0058AZ/ | AV | | B | Transistor (2SC3178) | [Q1] |
| 16 | 0CBUAC0078CZ/ | AG | | B | Transistor (2SC2061-Q) | [Q2] |
| 17 | 0CBUAC0004DZ/ | AC | | B | Transistor (2SC945-PA) | [Q3] |
| 18 | 0CBUAC0137AZ/ | AU | | B | Transistor (2SC3435) | [Q4,5] |
| 19 | VS2SB744-Q/-1 | AE | | B | Transistor (2SB744-Q) | [Q6] |
| 20 | VS2SA733-P/-1 | AE | | B | Transistor (2SA733-P) | [Q7] |
| 21 | 0CBUAA0054DZ/ | AN | | B | Transistor (2SA1441-K) | [Q8] |
| 22 | 0CBUAA0036CZ/ | AF | | B | Transistor (2SA934-Q) | [Q9,10] |
| 23 | 0CBUBB0087SZ/ | AN | | B | Diode (D5SB60(S)) | [D1] |
| 24 | 0CBUBC0130AA/ | AG | | B | Diode (RU2B) | [D2] |
| 25 | 0CBUBC0033CZ/ | AD | | B | Diode (ERB43-04) | [D3] |
| 26 | 0CBUBC0070AZ/ | AF | | B | Diode (ERA81-004) | [D4] |
| 27 | 0CBUBC0129BZ/ | AF | | B | Diode (EG01A) | [D5,6] |
| 28 | 0CBUBA0005AZ/ | AC | | B | Diode (1SS55) | [D7,8] |
| 29 | 0CBUBC0134AZ/ | AD | | B | Diode (SB007-03) | [D9] |
| 30 | 0CBUBC0152AZ/ | AE | | B | Diode (EL1Z) | [D10,11,15,18] |
| 31 | 0CBUBC0135AZ/ | AG | | B | Diode (ERB84-009) | [D12] |
| 32 | 0CBUBC0156AZ/ | AD | | B | Diode (EM01Z) | [D13,17] |
| 33 | VHDRK44////-1 | AH | | B | Diode (RK44) | [D14] |

## 10 Power supply unit

| NO. | PARTS CODE | PRICE RANK | NEW MARK | PART RANK | DESCRIPTION | |
|---|---|---|---|---|---|---|
| 34 | 0CBUBB0137BZ/ | AP | | B | Diode (FML−32S) | [D16] |
| 35 | VHERD5.6EB3−1 | AB | | B | Zenmer Diode (RD5.6EB3) | [ZD1] |
| 36 | 0CBUDZ0017ZZ/ | AQ | | B | Varistor (NV430−D10) | [V−1] |
| 37 | 0CBUEZ0303ZZ/ | AN | | B | Thermister (118−080−1) | [TH−1] |
| 38 | VHS2P4MCY//−1 | AL | | B | Thyristor (2P4M−CY) | [SCR−1] |
| 39 | 0CBUDC0041BZ/ | AQ | | B | Photo−coupler (SFH601−3) | [PC−1,2] |
| 40 | 0CBUGFM104BA/ | AQ | | C | Film capacitor (B8112−C−B125) | [C1] |
| 41 | 0CBUGFM224BA/ | AR | | C | Film capacitor (B8112−C−B127) | [C2] |
| 42 | 0CBUGCZ332BC/ | AE | | C | Ceramic capacitor (ECK−DNS332MEX) | [C3,4] |
| 43 | 0CBUGCF104AP/ | AD | | C | Ceramic capacitor (DD310F104Z50) | [C5,50] |
| 44 | 0CBUGBQ331AG/ | AY | | C | Chemical capacitor (LLK2G331MHSB) | [C6] |
| 45 | 0CBUGAZR47AY/ | AE | | C | Chemical capacitor (UHU2HR47TPA) | [C7] |
| 46 | 0CBUGCZ221AB/ | AC | | C | Ceramic capacitor (DE0705B221K1KV) | [C8] |
| 47 | 0CBUGFF104AR/ | AD | | C | Film capacitor (AMZ−104Z50) | [C9,41] |
| 48 | 0CBUGAF470BU/ | AE | | C | Chemical capacitor (UVX1H470MPA) | [C10] |
| 49 | 0CBUGFF103AR/ | AC | | C | Film capacitor (AMZ−103Z50) | [C11,18,19] |
| 50 | 0CBUGCZ102BC/ | AE | | C | Ceramic capacitor (ECK−DNS102MBX) | [C12] |
| 51 | 0CBUGCM395AD/ | AQ | | C | Film capacitor (QXF2G395KRPT) | [C13] |
| 52 | 0CBUGCZ222AB/ | AC | | C | Ceramic capacitor (DE1005B222K1KV) | [C14,15] |
| 53 | 0CBUGCF104AR/ | AC | | C | Ceramic capacitor (DD308F104Z25V) | [C16,17,30,31,38,42,44] |
| 54 | 0CBUGAE100BU/ | AC | | C | Chemical capacitor (UVX1V100MAA) | [C20,21] |
| 55 | 0CBUGAE471BU/ | AG | | C | Chemical capacitor (UVX1V471MPA) | [C22] |
| 56 | 0CBUGCF222AD/ | AB | | C | Ceramic capacitor (DD106B222K50) | [C23] |
| 57 | 0CBUGCZ102AD/ | AB | | C | Ceramic capacitor (DD06E102P500V) | [C24,25,33,39] |
| 58 | 0CBUGAD221BU/ | AD | | C | Chemical capacitor (UVX1E221MPA) | [C26,27] |
| 59 | 0CBUGAC101BU/ | AC | | C | Chemical capacitor (UVX1C101MPA) | [C28,29] |
| 60 | 0CBUGCZ103AD/ | AC | | C | Ceramic capacitor (DD14E103P500V) | [C32] |
| 61 | 0CBUGAC102BU/ | AE | | C | Chemical capacitor (UVX1C102MPA) | [C34] |
| 62 | 0CBUGAF1R0BU/ | AB | | C | Chemical capacitor (UVX1H010MAA) | [C35] |
| 63 | 0CBUGFF473AR/ | AB | | C | Film capacitor (AMZ−473K50) | [C36] |
| 64 | 0CBUGAC331BU/ | AD | | C | Chemical capacitor (UVX1C331MPA) | [C37] |
| 65 | 0CBUGAB222BU/ | AG | | C | Chemical capacitor (UVX1A222MHA) | [C40,43,50] |
| 66 | 0CBUGCZ222AD/ | AC | | C | Ceramic capacitor (DD08E222P500V) | [C45,46,47] |
| 67 | 0CBUGAE332BU/ | AN | | C | Chemical capacitor (UVX1V332MRA) | [C48,49] |
| 68 | 0CBUECC564AB/ | AB | | C | Solid resistor (RC1/2−564K−UL) | [R1] |
| 69 | VRD−ST2HY564J | AB | | C | Carbon resistor (1/2W 560KΩ ±5%) | [R2] |
| 70 | 0CBUEFF563AC/ | AD | | C | Metalized film resistor (RSF3P563J) | [R3] |
| 71 | VRD−ST2HY824J | AB | | C | Carbon resistor (1/2W 820KΩ ±5%) | [R4] |
| 72 | VRD−ST2HY181J | AB | | C | Carbon resistor (1/2W 180Ω ±5%) | [R5] |
| 73 | 0CBUEZ0026ZZ/ | AC | | C | Fusing resistor (FMR1/4J100) | [R6] |
| 74 | VRD−RC2EY221J | AA | | C | Carbon resistor (1/4W 220Ω ±5%) | [R7,8,10,13,28] |
| 75 | VRD−RC2EY102J | AA | | C | Carbon resistor (1/4W 1KΩ ±5%) | [R9,27,34,35,39,40,41,42] |
| 76 | VRD−RC2EY560J | AA | | C | Carbon resistor (1/4W 56Ω ±5%) | [R11] |
| 77 | VRD−RC2EY153J | AA | | C | Carbon resistor (1/4W 15KΩ ±5%) | [R12,45] |
| 78 | 0CBUEFE3R0AN/ | AC | | C | Metalized film resistor (MOS2J3R0) | [R14] |
| 79 | 0CBUEFE101AH/ | AC | | C | Metalized film resistor (RSF2P101J) | [R15] |
| 80 | VRD−RC2EY151J | AA | | C | Carbon resistor (1/4W 150Ω ±5%) | [R16,17] |
| 81 | 0CBUEFD2R0AF/ | AB | | C | Metalized film resistor (RSF1P2R0J) | [R18,19] |
| 82 | VRD−ST2HY102J | AB | | C | Carbon resistor (1/2W 1KΩ ±5%) | [R20,21] |
| 83 | VRD−RC2EY682J | AA | | C | Carbon resistor (1/4W 6.8KΩ ±5%) | [R22] |
| 84 | VRD−RC2EY123J | AA | | C | Carbon resistor (1/4W 12KΩ ±5%) | [R23] |
| 85 | VRD−RC2EY124J | AA | | C | Carbon resistor (1/4W 120KΩ ±5%) | [R24] |
| 86 | VRD−RC2EY183J | AA | | C | Carbon resistor (1/4W 18KΩ ±5%) | [R25] |
| 87 | VRD−RC2EY222J | AA | | C | Carbon resistor (1/4W 2.2KΩ ±5%) | [R26] |
| 88 | VRD−RC2EY273J | AA | | C | Carbon resistor (1/4W 27KΩ ±5%) | [R29] |
| 89 | VRD−ST2EY362J | AA | | C | Carbon resistor (1/4W 3.6KΩ ±5%) | [R30] |
| 90 | VRD−RC2EY101J | AA | | C | Carbon resistor (1/4W 100Ω ±5%) | [R31,32] |
| 91 | VRD−RC2EY103J | AA | | C | Carbon resistor (1/4W 10KΩ ±5%) | [R33] |
| 92 | 0CBUEFD560AF/ | AC | | C | Metalized film resistor (RSF1P560J) | [R36] |
| 93 | VRD−RC2EY561J | AA | | C | Carbon resistor (1/4W 560Ω ±5%) | [R37] |
| 94 | VRD−ST2HY220J | AB | | C | Carbon resistor (1/2W 22Ω ±5%) | [R38] |
| 95 | VRD−ST2HY5R6J | AA | | C | Carbon resistor (1/2W 5.6Ω ±5%) | [R43,44] |
| 96 | 0CBUEFE470AH/ | AC | | C | Metalized film resistor (RSF2P470J) | [R45] |
| 97 | VRD−RC2EY680J | AA | | C | Carbon resistor (1/4W 68Ω ±5%) | [R47] |
| 98 | 0CBUFZ0026ZZ/ | AK | | C | Manganese resistor (CMW−1.2−P15) | [R48] |
| 99 | VRD−RC2EY333J | AA | | C | Carbon resistor (1/4W 33KΩ ±5%) | [R49] |
| 100 | 0CBUFAC102AA/ | AE | | C | Variable resistor (V6EK−PV(1S)B102) | [VR1] |
| 101 | 0CBUFAC501AB/ | AD | | B | Variable resistor (V6EK−PH(1S)B501) | [VR2,3] |
| ⚠ 102 | 0CBPJC0332ZZ/ | AG | | A | Fuse (BET5A 250V) | [F1,2] |
| ⚠ 103 | 0CBPJT0088ZZ/ | AG | | B | Thermal cutoff (X22) | [F3] |
| ⚠ 104 | 0CBPJC0385ZZ/ | AG | | A | Fuse (BEQ0.5A 250V) | [F4] |
| ⚠ 105 | 0CBPJC0384ZZ/ | AG | | A | Fuse (BEQ3.15A 250V) | [F5] |
| 106 | 0CBPHZ0049ZZ/ | AT | | B | Relay (LZ5VM−UL) | [RY−1] |
| 107 | 0CBPEZ0026ZZ/ | AK | | B | AC inlet (NC−174D) | |
| ⚠ 108 | 0CBPFZ0111ZZ/ | AQ | | B | AC switch (EST−15727V) | [SW−1] |
| | (Unit) | | | | | |
| 901 | DUNTK4110SCZZ | CB | | E | Power supply | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

## 11 Liu board (Holland)

| NO. | PARTS CODE | PRICE RANK | NEW MARK | PART RANK | DESCRIPTION | |
|---|---|---|---|---|---|---|
| 1 | RATTN2009SCZZ | AK | | B | Arrestor | [AR] |
| 2 | VCE9AU1CW107Q | AD | | C | Capacitor (16WV 100μF) | [C1] |
| 3 | VCFYSU2EA225K | AH | | C | Capacitor (250WV 2.2μF) | [C2] |
| 4 | VCFYSU2EA474K | AE | | C | Capacitor (250WV 0.47μF) | [C3] |
| 5 | VCSATU1VE684M | AC | | C | Capacitor (35WV 0.68μF) | [C4] |
| 6 | VCEAAU1CW106Q | AB | | C | Capacitor (16WV 10μF) | [C5] |
| 7 | VCSAVU1CE226M | AD | | C | Capacitor (16WV 22μF) | [C6] |
| 8 | VCQYKU1HM473K | AB | | C | Capacitor (50WV 0.047μF) | [C7] |
| 9 | VCEAAU1HW105Q | AB | | C | Capacitor (50WV 1μF) | [C8] |
| 10 | VCKYPU1HF223Z | AA | | C | Capacitor (50WV 0.022μF) | [C9] |
| 11 | QCNCM2353SC1D | AC | | C | Connector (14pin) | [CN1] |
| 12 | QCNCM2353SC0E | AB | | C | Connector (5pin) | [CN2] |
| 13 | VHD10D1////-1 | AD | | B | Diode (10D1) | [D1] |
| 14 | VHD10D10///-1 | AE | | B | Diode (10D10) | [D2] |
| 15 | VHD10D1////-1 | AD | | B | Diode (10D1) | [D3] |
| 16 | VHiM54519P/-1 | AL | | B | IC (M54519P) | [IC1] |
| 17 | VHiiR9311//-1 | AE | | B | IC (IR9311) | [IC2] |
| 18 | RCiLZ2076SCZZ | AN | | C | Coil (RC-07 200μH) | [L1] |
| 19 | RCiLZ2076SCZZ | AN | | C | Coil (RC-07 200μH) | [L2] |
| 20 | VHPPC511///-1 | AM | | B | Photo transistor (PC511) | [PC1] |
| 21 | VRS-PT3DB181J | AB | | C | Resistor (2W 180Ω ±5%) | [R1] |
| 22 | VRS-PT3AB333J | AB | | C | Resistor (1W 33KΩ ±5%) | [R2] |
| 23 | VRS-PT3AB333J | AB | | C | Resistor (1W 33KΩ ±5%) | [R3] |
| 24 | VRD-RC2EY391J | AA | | C | Resistor (1/4W 390Ω ±5%) | [R4] |
| 25 | VRD-HT2EY562J | AA | | C | Resistor (1/4W 5.6KΩ ±5%) | [R6] |
| 26 | VRD-RC2EY102J | AA | | C | Resistor (1/4W 1KΩ ±5%) | [R7] |
| 27 | VRD-HT2EY472J | AA | | C | Resistor (1/4W 4.7KΩ ±5%) | [R8] |
| 28 | VRD-RC2EY102J | AA | | C | Resistor (1/4W 1KΩ ±5%) | [R9] |
| 29 | RCiLC2078SCZZ | AU | | C | Coil | [RETC] |
| 30 | VHVVR61S///-1 | AG | | B | Varistor (VR61S) | [SVR1] |
| 31 | QSW-Z1066HCZZ | AH | | B | Dip switch (8P)(51D-0801) | [SW1] |
| 32 | RTRNP2096SCZZ | AR | | B | Transfomer | [T1] |
| 33 | QTAND2026SCZZ | AN | | C | Terminal (5P) | [TB1] |
| 34 | RVR-M5215QCN2 | AE | | B | Variable resistor | [VR1] |
| 35 | VHERD5.6E6/-1 | AC | | B | Zener diode (RD5.6E6) | [ZD1] |
| 36 | QCNW-2768SCZZ | AB | | C | Earth cable | |
| 37 | RRLYZ2101QCN1 | AW | | B | Relay (ULR-10616H) | |
| 38 | RRLYZ3418QCZZ | BA | | B | Relay (MR24-N36AA) | |
| | (Unit) | | | | | |
| 901 | CPWBS2014SC01 | BS | N | E | Liu board | [Holland] |

## 12 Liu board (Other countries)

| NO. | PARTS CODE | PRICE RANK | NEW MARK | PART RANK | DESCRIPTION | |
|---|---|---|---|---|---|---|
| 1 | RATTN2009SCZZ | AK | | C | Arrestor | [AR] |
| 2 | VCE9AU1CW107Q | AD | | C | Capacitor (16WV 100μF) | [C1] |
| 3 | VCFYSU2EA225K | AH | | C | Capacitor (250WV 2.2μF) | [C2] |
| 4 | VCFYSU2EA474K | AE | | C | Capacitor (250WV 0.47μF) | [C3] |
| 5 | VCSATU1VE684M | AC | | C | Capacitor (35WV 0.68μF) | [C4] |
| 6 | VCEAAU1CW106Q | AB | | C | Capacitor (16WV 10μF) | [C5] |
| 7 | VCSAVU1CE226M | AD | | C | Capacitor (16WV 22μF) | [C6] |
| 8 | VCQYKU1HM473K | AB | | C | Capacitor (50WV 0.047μF) | [C7] |
| 9 | VCEAAU1HW105Q | AB | | C | Capacitor (50WV 1.0μF) | [C8] |
| 10 | VCKYPU1HF223Z | AA | | C | Capacitor (50WV 22000pF) | [C9] |
| 11 | RCiLC2078SCZZ | AU | | C | Choke coil | [CH1] |
| 12 | RRLYZ3418QCZZ | BA | | B | Relay | [CML] |
| 13 | QCNCM2353SC1D | AC | | C | Connector (14pin) | [CN1] |
| 14 | QCNCM2353SC0E | AB | | C | Connector (15pin) | [CN2] |
| 15 | VHD10D10///-1 | AE | | B | Diode (10D10) | [D1] |
| 16 | VHD10D10///-1 | AE | | B | Diode (10D10) | [D2] |
| 17 | VHD10D1////-1 | AD | | B | Diode (10D1) | [D3] |
| 18 | QSW-Z1066HCZZ | AH | | B | Dip switch (8P)(51D-0801) | [DIPSW1] |
| 19 | RRLYZ2101QCN1 | AW | | B | Relay | [H] |
| 20 | VHiM54519P/-1 | AL | | B | IC (M54519P) | [IC1] |
| 21 | VHiiR9311//-1 | AE | | B | IC (IR9311) | [IC2] |
| 22 | RCiLZ2076SCZZ | AN | | C | Coil (RC-07 200μH) | [L1] |
| 23 | RCiLZ2076SCZZ | AN | | C | Coil (RC-07 200μH) | [L2] |
| 24 | VHPPC511///-1 | AM | | B | Photo transistor (PC511) | [PC1] |
| 25 | VRS-PT3DB181J | AB | | C | Resistor (2W 180Ω ±5%) | [R1] |
| 26 | VRS-PT3AB333J | AB | | C | Resistor (1W 33KΩ ±5%) | [R2] |
| 27 | VRS-PT3AB333J | AB | | C | Resistor (1W 33KΩ ±5%) | [R3] |
| 28 | VRD-RC2EY391J | AA | | C | Resistor (1/4W 390Ω ±5%) | [R4] |
| 29 | VRS-PT3DB750J | AB | | C | Resistor (2W 75Ω ±5%) | [R5] |
| 30 | VRD-HT2EY562J | AA | | C | Resistor (1/4W 5.6KΩ ±5%) | [R6] |
| | VRD-RC2EY301J | AA | | C | Resistor (1/4W 30Ω ±5%) | [R14] [Germany] |
| 31 | VRD-RC2EY102J | AA | | C | Resistor (1/4W 1KΩ ±5%) | [R7] |

## 12 Liu board (Other countries)

| NO. | PARTS CODE | PRICE RANK | NEW MARK | PART RANK | DESCRIPTION | |
|---|---|---|---|---|---|---|
| 32 | VRS-PT3DB472J | AB | | C | Resistor (2W 4.7KΩ ±5%) | [R8] |
| 33 | VRD-RC2EY102J | AA | | C | Resistor (1/4W 1KΩ ±5%) | [R9] |
| 34 | VRS-PT3AB103J | AB | | C | Resistor (1W 10KΩ ±5%) | [R10] |
| 35 | VRS-PT3AB472J | AB | | C | Resistor (1W 4.7KΩ ±5%) | [R11] |
| | VRD-RC2EY102J | AA | | C | Resistor (1/4W 1KΩ ±5%) | [R15] [Other countries] |
| 36 | VRS-PT3AB103J | AB | | C | Resistor (1W 10KΩ ±5%) | [R12] |
| 37 | VRS-PT3AB472J | AB | | C | Resistor (1W 4.7KΩ ±5%) | [R13] |
| 38 | QCNCM1047ACZZ | AD | | C | Connector | [S1] |
| 39 | QCNCW1035ACZZ | AC | | C | Connector | [S1] |
| 40 | QCNCM1047ACZZ | AD | | C | Connector | [S2] |
| 41 | QCNCW1035ACZZ | AC | | C | Connector | [S2] |
| 42 | QCNCM1047ACZZ | AD | | C | Connector | [S3] |
| 43 | QCNCW1035ACZZ | AC | | C | Connector | [S3] |
| 44 | QCNCM1047ACZZ | AD | | C | Connector | [S4] |
| 45 | QCNCW1035ACZZ | AC | | C | Connector | [S4] |
| 46 | QCNCM1047ACZZ | AD | | C | Connector | [S5] |
| 47 | QCNCW1035ACZZ | AC | | C | Connector | [S5] |
| 48 | QCNCM1047ACZZ | AD | | C | Connector | [S6] |
| 49 | QCNCW1035ACZZ | AC | | C | Connector | [S6] |
| 50 | QCNCM1047ACZZ | AD | | C | Connector | [S7] |
| 51 | QCNCW1035ACZZ | AC | | C | Connector | [S7] |
| 52 | QCNCM1047ACZZ | AD | | C | Connector | [S8] |
| 53 | QCNCW1035ACZZ | AC | | C | Connector | [S8] |
| 54 | QCNCM1048ACZZ | AE | | C | Connector | [S9] |
| 55 | QCNCW1035ACZZ | AC | | C | Connector | [S9] |
| 56 | QCNCM1048ACZZ | AE | | C | Connector | [S10] |
| 57 | QCNCW1035ACZZ | AC | | C | Connector | [S10] |
| 58 | VHVVR61S///-1 | AG | | B | Varistor (VR61S) | [SVR1] |
| 59 | VHVVR61S///-1 | AG | | B | Varistor (VR61S) | [SVR2] |
| 60 | RTRNP2097SCZZ | AU | N | B | Transformer | [T1] |
| 61 | QTAND2026SCZZ | AN | | C | Terminal (5P) | [TB] |
| 62 | RVR-M5215QCN2 | AE | | B | Variable resistor | [VR1] |
| 63 | VHERD5 6E6/-1 | AC | | B | Diode,zener (RD5.6E6) | [ZD1] |
| 64 | QCNW-2768SCZZ | AC | | C | Earth cable | |
| | (Unit) | | | | | |
| 901 | CPWBS1979SC01 | BW | N | E | Liu board | [Germany] |
| | CPWBS1979SC03 | BW | N | E | Liu board | [Other countries] |

## 13 Modem interface board

| NO. | PARTS CODE | PRICE RANK | NEW MARK | PART RANK | DESCRIPTION | |
|---|---|---|---|---|---|---|
| 1 | RC-K1H104HCZZ | AC | | C | Capacitor (50WV 0.1μF) | [C1] |
| 2 | VCKYPU1HB151K | AA | | C | Capacitor (50WV 150pF) | [C2] |
| 3 | RC-K1H104HCZZ | AC | | C | Capacitor (50WV 0.1μF) | [C3] |
| 4 | VCE9AU1CW106Q | AC | | C | Capacitor (16WV 10μF) | [C4] |
| 5 | RC-K1H104HCZZ | AC | | C | Capacitor (50WV 0.1μF) | [C5] |
| 6 | VCSAVU1VE684M | AB | | C | Capacitor (35WV 0.68μF) | [C6] |
| 7 | QCNCW2356SC1B | AK | | C | Connector (12pin) | [CNC] |
| 8 | QCNCM2356SC1B | AL | | C | Connector (12pin) | [CND] |
| 9 | VHiNJM4558F-1 | AD | | B | IC (NJM4558F) | [IC1] |
| 10 | VHiTC4053BF-1 | AG | | B | IC (TC4053BF) | [IC2] |
| 11 | VHiNJM4558F-1 | AD | | B | IC (NJM4558F) | [IC3] |
| 12 | VHi4M462C1/-1 | AZ | | B | IC (4M462C1) | [IC4] |
| 13 | VHi12G2000A-1 | AZ | | B | IC (12G2000A) | [IC5] |
| 14 | VHiAFL26L3400 | AZ | | B | IC (AFL26L3400) | [IC6] |
| 15 | QPiN-2005SCZZ | AA | | C | 0Ωpin (0Ω) | [J1] |
| 16 | VRNRC2EK2052F | AA | | C | Resistor (1/4W 20.5KΩ ±1%) | [R1] |
| 17 | VRNRC2EK2002F | AA | | C | Resistor (1/4W 20KΩ ±1%) | [R2] |
| 18 | VRNRC2EK1002F | AA | | C | Resistor (1/4W 10KΩ ±1%) | [R3] |
| 19 | VRNRC2EK2001F | AA | | C | Resistor (1/4W 2KΩ ±1%) | [R4] |
| 20 | VRNRC2EK2002F | AA | | C | Resistor (1/4W 20KΩ ±1%) | [R5] |
| 21 | VRNRC2EK8871F | AA | | C | Resistor (870Ω ±1%) | [R6] |
| 22 | VRD-HT2EY103J | AA | | C | Resistor (1/4W 10KΩ ±5%) | [R7] |
| 23 | VRNRC2EK8201F | AA | | C | Resistor (200Ω ±1%) | [R8] |
| 24 | VRNRC2EK3242F | AA | | C | Resistor (2.4KΩ ±1%) | [R9] |
| 25 | QSW-S1359CCZZ | AD | | B | Switch | [SW1] |
| 26 | RVR-M2411QCZZ | AP | | B | Variable resistor (10KΩ) | [VR1] |
| 27 | RVR-M1411QCZZ | AM | | B | Variable resistor (20KΩ) | [VR2] |
| 28 | GCOVH2234SCZZ | AL | N | C | Filter cover | |
| | (Unit) | | | | | |
| 901 | CPWBS1996SC01 | BP | N | E | Modem interface board | |

## 14 Receive sensor board

| NO. | PARTS CODE | PRICE RANK | NEW MARK | PART RANK | DESCRIPTION |
|---|---|---|---|---|---|
| 1 | QCNW-2806SCZZ | AE | | C | Receive sensor cable |
| 2 | RVR-MD410QCN1 | AD | | B | Variable resistor (47KΩ) |
| 3 | VHPRPR359F/-1 | AK | | B | Photo transistor (RPR359F) |
| 4 | VRD-HT2EY102J | AA | | C | Resistor (1/4W 1.0KΩ ±5%) |
| 5 | XUPSD30P06000 | AA | | C | Screw (3×6) |
| | (Unit) | | | | |
| 901 | CPWBS2036SC01 | AV | | E | Receive sensor board |

## 50 Hardware Parts

| NO. | PARTS CODE | PRICE RANK | NEW MARK | PART RANK | DESCRIPTION |
|---|---|---|---|---|---|
| B01 | LX-BZ1011HCZZ | AA | | C | Screw |
| B02 | LX-BZ2050SCZZ | AC | | C | Screw |
| B03 | LX-BZ2068SCZZ | AC | | C | Screw |
| B04 | LX-BZ2070SCZZ | AB | | C | Screw |
| B05 | LX-BZ2074SCZZ | AA | | C | Screw |
| B06 | LX-BZ2075SCZZ | AB | | C | Screw |
| B07 | LX-UZ2001HCZZ | AA | | C | Screw |
| B10 | XBPBZ40P06K00 | AA | | C | Screw (4×6K) |
| B11 | XBPSD30P04K00 | AA | | C | Screw (3×4K) |
| B12 | XBPSD30P04000 | AA | | C | Screw (3×4) |
| B13 | XBPSD30P06K00 | AA | | C | Screw (3×6K) |
| B14 | XBPSD30P06000 | AA | | C | Screw (3×6) |
| B15 | XBPSD30P08K00 | AA | | C | Screw (3×8K) |
| B16 | XBPSD40P06K00 | AA | | C | Screw (4×6K) |
| B17 | XBSSD30P04000 | AA | | C | Screw (3×4) |
| B18 | XCPSC30P08000 | AA | | C | Screw (3×8) |
| B19 | XCPSD30P06000 | AA | | C | Screw (3×6) |
| B20 | XCPSD30P08000 | AA | | C | Screw (3×8) |
| B21 | XUPSD30P06000 | AA | | C | Screw (3×6) |
| B22 | XUPSD30P08000 | AA | | C | Screw (3×8) |
| B23 | LX-BZ2073SCZZ | AA | | C | Screw |
| B24 | XBPSC30P08000 | AA | | C | Screw (3×8) |
| B25 | XBPSD30P06KS0 | AA | | C | Screw (3×6KS) |
| B26 | XBPSD20P04000 | AA | | C | Screw (2×4) |
| B27 | XBPSD26P06000 | AA | | C | Screw (2.6×6) |
| B28 | XXXSP30L03000 | AA | | C | Screw (3×3) |
| B29 | 00P3A13150// | AB | | C | Screw |
| E01 | XRESJ30-05000 | AA | | C | E type ring (3mm) |
| E02 | XRESJ30-06000 | AA | | C | E type ring (3mm) |
| E03 | XRESJ40-05000 | AA | | C | E type ring (4mm) |
| E04 | XRESJ40-06000 | AA | | C | E type ring (4mm) |
| E05 | XRESJ50-06000 | AA | | C | E type ring (5mm) |
| E06 | XRESJ30-04000 | AA | | C | E type ring (3mm) |
| W02 | LX-WZ2020SCZZ | AB | | C | Washer |
| W03 | LX-WZ2026SCZZ | AA | | C | Washer |

## ■ Index

| PARTS CODE | NO. | PRICE RANK | NEW MARK | PART RANK | |
|---|---|---|---|---|---|
| 〔C〕 | | | | | |
| CCNW-2487SC01 | 8- 5 | AW | | B | |
| CCNW-2805SC01 | 6- 8 | BA | | E | |
| CGERH2071SC01 | 6- 9 | AR | | C | |
| CHŌP-2045SC03 | 1- 5 | AP | | E | |
| CLEVF2070SC01 | 4- 1 | AT | | C | |
| CMŌTZ2039SC01 | 6- 41 | BD | | E | |
| CMŌTZ2040SC01 | 5- 15 | BC | | E | |
| CPWBS1952SC01 | 5- 4 | BM | | E | |
| CPWBS1979SC01 | 3- 10 | BW | N | E | |
| 〃 | 12- 901 | BW | N | E | |
| CPWBS1979SC03 | 3- 10 | BW | N | E | |
| 〃 | 12- 901 | BW | N | E | |
| CPWBS1996SC01 | 13- 901 | BP | N | E | |
| CPWBS2014SC01 | 3- 10 | BS | N | E | |
| 〃 | 11- 901 | BS | N | E | |
| CPWBS2036SC01 | 14- 901 | AV | | E | |
| CRŌLP2123SC01 | 4- 3 | AM | | C | |
| CSHEZ2281SC01 | 8- 101 | AQ | | C | |
| 〔D〕 | | | | | |
| DUNTK3891SCZZ | 3- 4 | CV | N | E | |
| 〃 | 9- 901 | CV | N | E | |
| DUNTK3987SCZZ | 3- 1 | CD | | E | |
| 〃 | 9- 902 | CD | | E | |
| DUNTK3993SCZZ | 6- 18 | CP | | E | |
| DUNTK4110SCZZ | 3- 11 | CB | | E | |
| 〃 | 10- 901 | CB | | E | |
| DUNTK4112SCZZ | 4- 501 | BK | | E | |
| 〃 | 7- 901 | BK | | E | |
| DUNTK4820SCZZ | 3- 4 | CV | N | E | |
| 〃 | 9- 901 | CV | N | E | |
| 〔G〕 | | | | | |
| GCŌVA2222SCZC | 2- 2 | AR | | C | |
| GCŌVA2224SCZD | 2- 5 | AH | | C | |
| GCŌVA2230SCZZ | 2- 6 | AL | | C | |
| GCŌVH2234SCZZ | 13- 28 | AL | N | C | |
| GLEGG2024SCZZ | 5- 16 | AB | | C | |
| 〔J〕 | | | | | |
| JKNBZ2025SCZB | 2- 3 | AB | | C | |
| 〔L〕 | | | | | |
| LANGT2638SCZZ | 6- 23 | AC | | C | |
| LANGT2639SCZZ | 6- 29 | AC | | C | |
| LANGT2640SCZZ | 5- 7 | AC | | C | |
| LANGT2641SCZZ | 5- 9 | AC | | C | |
| LBNDJ2003SCZZ | 3- 7 | AA | | C | |
| 〃 | 6- 3 | AA | | C | |
| LBŌS-2011SCZZ | 6- 21 | AD | | C | |
| LFRM-2076SCZZ | 6- 22 | AV | | C | |
| LHLDW2020SCZZ | 3- 6 | AB | | C | |
| 〃 | 6- 46 | AB | | C | |
| LPLTG2276SCZZ | 4- 9 | AF | | C | |
| LPLTM2277SCZZ | 6- 35 | AG | | C | |
| LPLTM2284SCZZ | 6- 40 | AP | | C | |
| LPLTM2285SCZZ | 5- 19 | AE | | C | |
| LPLTM2286SCZZ | 5- 10 | AK | | C | |
| LPLTM2287SCZZ | 6- 27 | AG | | C | |
| LPLTM2288SCZZ | 5- 14 | AH | | C | |
| LPLTM2293SCZZ | 6- 4 | AF | | C | |
| LPLTP2279SCZB | 5- 8 | AF | | C | |
| LX-BZ1011HCZZ | 50-B01 | AA | | C | |
| LX-BZ2050SCZZ | 50-B02 | AC | | C | |
| LX-BZ2068SCZZ | 50-B03 | AC | | C | |
| LX-BZ2070SCZZ | 50-B04 | AB | | C | |
| LX-BZ2073SCZZ | 50-B23 | AA | | C | |
| LX-BZ2074SCZZ | 50-B05 | AA | | C | |
| LX-BZ2075SCZZ | 50-B06 | AB | | C | |
| LX-UZ2001HCZZ | 50-B07 | AA | | C | |
| LX-WZ2020SCZZ | 50-W02 | AB | | C | |
| LX-WZ2026SCZZ | 50-W03 | AA | | C | |
| 〔M〕 | | | | | |
| MLEVM2073SCZZ | 5- 1 | AL | | C | |
| MLEVP2074SCZA | 6- 2 | AC | | C | |
| MSPRC2209SCZZ | 1- 2 | AB | | C | |
| MSPRP2205SCZZ | 4- 2 | AC | | C | |
| MSPRP2206SCZZ | 4- 11 | AC | | C | |
| MSPRP2207SCZZ | 4- 8 | AC | | C | |
| MSPRP2210SCZZ | 6- 24 | AD | | C | |
| MSPRT2212SCZZ | 5- 17 | AA | | C | |
| MSPRT2213SCZZ | 3- 3 | AC | | C | |
| MSPRT2214SCZZ | 3- 8 | AC | | C | |

| PARTS CODE | NO. | PRICE RANK | NEW MARK | PART RANK | |
|---|---|---|---|---|---|
| MSPRT2219SCZZ | 2- 4 | AA | | C | |
| 〔N〕 | | | | | |
| NBRGY2079SCZZ | 4- 5 | AB | | C | |
| 〃 | 6- 10 | AB | | C | |
| NBRGY2080SCZZ | 6- 15 | AB | | C | |
| NBRGY2081SCZZ | 5- 5 | AB | | C | |
| NBRGY2082SCZZ | 5- 6 | AB | | C | |
| NGERH2058SCZB | 1- 3 | AC | | C | |
| NGERH2060SCZZ | 6- 38 | AC | | C | |
| NGERH2061SCZZ | 6- 37 | AC | | C | |
| NGERH2062SCZZ | 6- 39 | AC | | C | |
| NGERH2064SCZZ | 6- 12 | AR | | C | |
| NGERH2065SCZZ | 6- 25 | AC | | C | |
| NGERH2066SCZZ | 6- 14 | AC | | C | |
| NGERH2068SCZZ | 5- 12 | AH | | C | |
| NGERH2069SCZZ | 5- 13 | AC | | C | |
| NGERH2070SCZZ | 6- 36 | AC | | C | |
| NGERP2057SCZZ | 4- 10 | AC | | C | |
| NGERP2059SCZZ | 1- 1 | AC | | C | |
| NRŌLR2122SCZZ | 4- 4 | AU | | C | |
| NRŌLR2124SCZZ | 6- 11 | AP | | C | |
| NRŌLR2125SCZZ | 6- 13 | AR | | C | |
| NRŌLR2126SCZZ | 6- 16 | AM | | C | |
| NRŌLR2127SCZZ | 6- 26 | AM | | C | |
| NRŌLR2128SCZZ | 5- 2 | AX | | C | |
| 〔P〕 | | | | | |
| PBRS-2012SCZZ | 4- 7 | AH | | C | |
| PGiDH2189SCZZ | 2- 1 | AE | | C | |
| 〃 | 8- 9 | AE | | C | |
| PGiDH2190SCZZ | 4- 6 | AS | | C | |
| PGiDH2191SCZZ | 6- 1 | AM | | C | |
| PGiDP2192SCZB | 1- 7 | AC | | C | |
| PGiDP2193SCZB | 1- 6 | AC | | C | |
| PGLSZ2019SCZZ | 6- 17 | AH | | B | |
| PHEDZ2026SCZZ | 6- 34 | CC | | B | |
| PSHEZ2267SCZZ | 5- 11 | AL | | C | |
| PSHEZ2276SCZZ | 3- 2 | AB | | C | |
| PSHEZ2282SCZZ | 6- 20 | AC | | C | |
| PSHEZ2283SCZZ | 3- 9 | AB | | C | |
| PSHEZ2284SCZB | 3- 12 | AC | | C | |
| PSHEZ2291SCZZ | 6- 30 | AA | | C | |
| PTPEZ2011SCZZ | 6- 31 | AA | | C | |
| PWiR-2005SCZZ | 6- 44 | AD | | C | |
| 〔Q〕 | | | | | |
| QCNCM1047ACZZ | 12- 38 | AD | | C | |
| 〃 | 12- 40 | AD | | C | |
| 〃 | 12- 42 | AD | | C | |
| 〃 | 12- 44 | AD | | C | |
| 〃 | 12- 46 | AD | | C | |
| 〃 | 12- 48 | AD | | C | |
| 〃 | 12- 50 | AD | | C | |
| 〃 | 12- 52 | AD | | C | |
| QCNCM1048ACZZ | 12- 54 | AE | | C | |
| 〃 | 12- 56 | AE | | C | |
| QCNCM2350SC9F | 9- 67 | AR | | C | |
| QCNCM2351SC2F | 9- 74 | AH | | C | |
| QCNCM2353SC0E | 11- 12 | AB | | C | |
| 〃 | 12- 14 | AB | | C | |
| QCNCM2353SC0F | 9- 73 | AB | | C | |
| QCNCM2353SC0i | 9- 70 | AB | | C | |
| QCNCM2353SC1D | 11- 11 | AC | | C | |
| 〃 | 12- 13 | AC | | C | |
| QCNCM2354SC1B | 9- 71 | AG | | C | |
| QCNCM2356SC1B | 9- 69 | AL | | C | |
| 〃 | 13- 8 | AL | | C | |
| QCNCM2502RC4J | 9- 72 | AK | | C | |
| QCNCW1035ACZZ | 12- 39 | AC | | C | |
| 〃 | 12- 41 | AC | | C | |
| 〃 | 12- 43 | AC | | C | |
| 〃 | 12- 45 | AC | | C | |
| 〃 | 12- 47 | AC | | C | |
| 〃 | 12- 49 | AC | | C | |
| 〃 | 12- 51 | AC | | C | |
| 〃 | 12- 53 | AC | | C | |
| 〃 | 12- 55 | AC | | C | |
| 〃 | 12- 57 | AC | | C | |
| QCNCW2356SC1B | 9- 68 | AK | | C | |
| 〃 | 13- 7 | AK | | C | |
| QCNW-2768SCZZ | 11- 36 | AB | | C | |
| 〃 | 12- 64 | AC | | C | |

| PARTS CODE | NO. | PRICE RANK | NEW MARK | PART RANK | |
|---|---|---|---|---|---|
| QCNW-2801SCZZ | 6- 33 | AV | | C | |
| QCNW-2802SCZZ | 6- 32 | AP | | C | |
| QCNW-2805SCZZ | 6- 7 | AH | | C | |
| QCNW-2806SCZZ | 14- 1 | AE | | C | |
| QCNW-2810SCZZ | 6- 19 | AM | | C | |
| QCNW-2827SCZZ | 4- 12 | AB | | C | |
| // | 5- 22 | AB | | C | |
| // | 6- 28 | AB | | C | |
| QCNW-2880SCZZ | 5- 20 | BE | | C | |
| QCNW-5097SCZZ | 5- 21 | AB | | C | |
| // | 6- 43 | AB | | C | |
| QPiN-2005SCZZ | 13- 15 | AA | | C | |
| QPWBF1958SCZZ | 6- 5 | AB | | C | |
| QSOCZ6428ACZZ | 9- 271 | AE | | C | |
| QSOCZ6440ACZZ | 9- 272 | AG | | C | |
| QSW-M2120SCZZ | 3- 5 | AG | | B | |
| // | 5- 3 | AG | | B | |
| QSW-S1359CCZZ | 9- 254 | AD | | B | |
| // | 13- 25 | AD | | B | |
| QSW-Z1066HCZZ | 11- 31 | AH | | B | |
| // | 12- 18 | AH | | B | |
| QSW-Z1067HCZZ | 9- 256 | AF | | B | |
| QSW-Z2115SCZZ | 9- 255 | AL | | B | |
| QTAND2026SCZZ | 11- 33 | AN | | C | |
| // | 12- 61 | AN | | C | |
| [R] | | | | | |
| RALMB2008SCZZ | 9- 12 | AG | | B | |
| RATTN2009SCZZ | 11- 1 | AK | | B | |
| // | 12- 1 | AK | | C | |
| RC-KZ1018CCZZ | 9- 26 | AE | | C | |
| RC-KIH104HCZZ | 13- 1 | AC | | C | |
| // | 13- 3 | AC | | C | |
| // | 13- 5 | AC | | C | |
| RCiLC2078SCZZ | 11- 29 | AU | | C | |
| // | 12- 11 | AU | | C | |
| RCiLZ2076SCZZ | 11- 18 | AN | | C | |
| // | 11- 19 | AN | | C | |
| // | 12- 22 | AN | | C | |
| // | 12- 23 | AN | | C | |
| RCRSQ2007SCZZ | 9- 269 | AL | | B | |
| RCRSQ2037SCZZ | 9- 270 | AY | | B | |
| RCRSQ2038SCZZ | 9- 268 | AR | | B | |
| RH-DX2006SCZZ | 9- 81 | AF | | B | |
| // | 9- 82 | AF | | B | |
| RMPTC4103QCKB | 9- 9 | AC | | B | |
| RMPTC4472QCKB | 9- 2 | AB | | B | |
| // | 9- 3 | AB | | B | |
| // | 9- 4 | AB | | B | |
| // | 9- 5 | AB | | B | |
| // | 9- 7 | AB | | B | |
| RMPTC8103QCKB | 9- 6 | AD | | B | |
| // | 9- 8 | AD | | B | |
| // | 9- 10 | AD | | B | |
| // | 9- 11 | AD | | B | |
| RRLYZ2101QCN1 | 11- 37 | AW | | B | |
| // | 12- 19 | AW | | B | |
| RRLYZ3418QCZZ | 11- 38 | BA | | B | |
| // | 12- 12 | BA | | B | |
| RTRNP2096SCZZ | 11- 32 | AR | | B | |
| RTRNP2097SCZZ | 12- 60 | AU | N | B | |
| RVR-MD211QCN1 | 9- 267 | AD | | B | |
| RVR-MD410QCN1 | 14- 2 | AD | | B | |
| RVR-M1411QCZZ | 13- 27 | AM | | B | |
| RVR-M2411QCZZ | 13- 26 | AP | | B | |
| RVR-M5215QCN2 | 11- 34 | AE | | B | |
| // | 12- 62 | AE | | B | |
| [S] | | | | | |
| SPAKA2591SCZZ | 8- 8 | AC | | D | |
| SPAKA2624SCZZ | 8- 10 | AH | | D | |
| SPAKA2625SCZZ | 8- 4 | AH | | D | |
| SPAKC2626SCZZ | 8- 11 | AM | | D | |
| [T] | | | | | |
| TiNSE2150SCZZ | 8- 1 | BD | N | D | |
| TiNSG2151SCZZ | 8- 1 | BD | N | D | |
| TLABH2403SCZZ | 5- 23 | AA | | C | |
| // | 6- 42 | AA | | C | |
| TLABS2347SCZZ | 6- 45 | AB | | C | |
| [U] | | | | | |
| UBATN2319RCZZ | 9- 1 | AV | | B | |
| UBNDA1008CCZZ | 8- 12 | AA | | C | |

| PARTS CODE | NO. | PRICE RANK | NEW MARK | PART RANK | |
|---|---|---|---|---|---|
| [V] | | | | | |
| VCCCPU1HH270J | 9- 25 | AA | | C | |
| VCEAAU1CW106Q | 11- 6 | AB | | C | |
| // | 12- 6 | AB | | C | |
| VCEAAU1HW105Q | 11- 9 | AB | | C | |
| // | 12- 9 | AB | | C | |
| VCE9AU1CW106Q | 13- 4 | AC | | C | |
| VCE9AU1CW1C7Q | 11- 2 | AD | | C | |
| // | 12- 2 | AD | | C | |
| VCFYSU2EA225K | 11- 3 | AH | | C | |
| // | 12- 3 | AH | | C | |
| VCFYSU2EA474K | 11- 4 | AE | | C | |
| // | 12- 4 | AE | | C | |
| VCKYPU1HB102K | 9- 22 | AA | | C | |
| // | 9- 28 | AA | | C | |
| // | 9- 33 | AA | | C | |
| VCKYPU1HB151K | 13- 2 | AA | | C | |
| VCKYPU1HB222K | 9- 17 | AA | | C | |
| // | 9- 18 | AA | | C | |
| // | 9- 19 | AA | | C | |
| // | 9- 21 | AA | | C | |
| // | 9- 39 | AA | | C | |
| // | 9- 53 | AA | | C | |
| // | 9- 54 | AA | | C | |
| // | 9- 55 | AA | | C | |
| // | 9- 56 | AA | | C | |
| VCKYPU1HF223Z | 9- 13 | AA | | C | |
| // | 9- 14 | AA | | C | |
| // | 9- 20 | AA | | C | |
| // | 9- 23 | AA | | C | |
| // | 9- 27 | AA | | C | |
| // | 9- 29 | AA | | C | |
| // | 9- 32 | AA | | C | |
| // | 9- 34 | AA | | C | |
| // | 9- 35 | AA | | C | |
| // | 9- 37 | AA | | C | |
| // | 9- 38 | AA | | C | |
| // | 9- 40 | AA | | C | |
| // | 9- 42 | AA | | C | |
| // | 9- 44 | AA | | C | |
| // | 9- 45 | AA | | C | |
| // | 9- 46 | AA | | C | |
| // | 9- 47 | AA | | C | |
| // | 9- 48 | AA | | C | |
| // | 9- 50 | AA | | C | |
| // | 9- 57 | AA | | C | |
| // | 9- 58 | AA | | C | |
| // | 9- 60 | AA | | C | |
| // | 9- 61 | AA | | C | |
| // | 9- 62 | AA | | C | |
| // | 9- 63 | AA | | C | |
| // | 9- 65 | AA | | C | |
| // | 9- 66 | AA | | C | |
| // | 11- 10 | AA | | C | |
| // | 12- 10 | AA | | C | |
| VCQYKU1HM102K | 9- 15 | AA | | C | |
| VCQYKU1HM333K | 9- 64 | AB | | C | |
| VCQYKU1HM473K | 11- 8 | AB | | C | |
| // | 12- 8 | AB | | C | |
| VCSATU1EE106M | 9- 43 | AE | | C | |
| VCSATU1VE684M | 11- 5 | AC | | C | |
| // | 12- 5 | AC | | C | |
| VCSAVA1AE336M | 9- 30 | AD | | C | |
| // | 9- 49 | AD | | C | |
| VCSAVU1AE336M | 9- 273 | AD | | C | |
| VCSAVU1CE106M | 9- 24 | AC | | C | |
| VCSAVU1CE226M | 11- 7 | AD | | C | |
| // | 12- 7 | AD | | C | |
| VCSAVU1EE106M | 9- 16 | AD | | C | |
| // | 9- 31 | AD | | C | |
| // | 9- 36 | AD | | C | |
| // | 9- 41 | AD | | C | |
| // | 9- 51 | AD | | C | |
| VCSAVU1VE684M | 13- 6 | AB | | C | |
| VHDDSS133//-1 | 9- 75 | AA | | B | |
| // | 9- 76 | AA | | B | |
| VHDDSS133HV-1 | 9- 77 | AA | | B | |
| // | 9- 78 | AA | | B | |
| // | 9- 79 | AA | | B | |
| VHDRK44////-1 | 10- 33 | AH | | B | |

| PARTS CODE | NO. | PRICE RANK | NEW MARK | PART RANK | |
|---|---|---|---|---|---|
| VHD10D1////-1 | 11- 13 | AD | | B | |
| // | 11- 15 | AD | | B | |
| // | 12- 17 | AD | | B | |
| VHD10D10///-1 | 11- 14 | AE | | B | |
| // | 12- 15 | AE | | B | |
| // | 12- 16 | AE | | B | |
| VHERD4.7E2/-1 | 9- 80 | AB | | B | |
| VHERD5.6EB3-1 | 10- 35 | AB | | B | |
| VHERD5.6E6/-1 | 11- 35 | AC | | B | |
| // | 12- 63 | AC | | B | |
| VHiAFL26L3400 | 13- 14 | AZ | | B | |
| VHiHA19203MPN | 9- 96 | AU | | B | |
| VHiHD46304/-1 | 9- 93 | BH | | B | |
| VHiHM6147LP-1 | 9- 128 | AX | | B | |
| // | 9- 132 | AX | | B | |
| VHiHM6264AL15 | 9- 142 | AW | | B | |
| // | 9- 143 | AW | | B | |
| VHiiR2339//-1 | 9- 144 | AG | | B | |
| VHiiR9311//-1 | 11- 17 | AE | | B | |
| // | 12- 21 | AE | | B | |
| VHiLH236769-1 | 9- 120 | AN | | B | |
| VHiLZ92E33/-1 | 9- 124 | AX | | B | |
| VHiLZ92F33/-1 | 9- 89 | AY | | B | |
| VHiMSM6242RS1 | 9- 139 | AV | | B | |
| VHiMS82C43GSV | 9- 129 | AR | | B | |
| VHiMS82C53GSV | 9- 104 | AR | | B | |
| // | 9- 106 | AR | | B | |
| // | 9- 108 | AR | | B | |
| VHiM5M82C55-1 | 9- 103 | AS | | B | |
| // | 9- 105 | AS | | B | |
| // | 9- 107 | AS | | B | |
| // | 9- 109 | AS | | B | |
| VHiM53204P/-1 | 9- 123 | AF | | B | |
| // | 9- 148 | AF | | B | |
| VHiM53206P/-1 | 9- 133 | AF | | B | |
| VHiM54519P/-1 | 11- 16 | AL | | B | |
| // | 12- 20 | AL | | B | |
| VHiNJM4558F-1 | 13- 9 | AD | | B | |
| // | 13- 11 | AD | | B | |
| VHiPST520C-2/ | 9- 265 | AK | | B | |
| VHiSTA403A/-1 | 9- 146 | AL | | B | |
| // | 9- 147 | AL | | B | |
| VHiTC4053BF-1 | 13- 10 | AG | | B | |
| VHiTC74HC00FN | 9- 118 | AD | | B | |
| // | 9- 134 | AD | | B | |
| VHiTC74HC02FN | 9- 116 | AD | | B | |
| // | 9- 137 | AD | | B | |
| // | 9- 149 | AD | | B | |
| VHiTC74HC04FN | 9- 113 | AD | | B | |
| // | 9- 121 | AD | | B | |
| // | 9- 130 | AD | | B | |
| // | 9- 136 | AD | | B | |
| VHiTC74HC08FN | 9- 91 | AD | | B | |
| // | 9- 135 | AD | | B | |
| VHiTC74HC123F | 9- 131 | AH | | B | |
| VHiTC74HC125F | 9- 90 | AH | | B | |
| VHiTC74HC138F | 9- 97 | AL | | B | |
| // | 9- 101 | AL | | B | |
| // | 9- 102 | AL | | B | |
| VHiTC74HC139F | 9- 119 | AH | | B | |
| VHiTC74HC14FN | 9- 122 | AH | | B | |
| // | 9- 141 | AH | | B | |
| VHiTC74HC174F | 9- 138 | AH | | B | |
| VHiTC74HC244F | 9- 83 | AM | | B | |
| VHiTC74HC245F | 9- 110 | AM | | B | |
| VHiTC74HC32FN | 9- 115 | AE | | B | |
| VHiTC74HC367F | 9- 86 | AG | | B | |
| // | 9- 87 | AG | | B | |
| VHiTC74HC374F | 9- 145 | AL | | B | |
| VHiTC74HC74FN | 9- 92 | AF | | B | |
| // | 9- 100 | AF | | B | |
| VHiTL084CN/-F | 9- 94 | AN | | B | |
| // | 9- 98 | AN | | B | |
| VHiTMM2015AP1 | 9- 88 | AQ | | B | |
| VHiTMPZ84C00P | 9- 111 | AZ | | B | |
| VHiTMPZ84C10P | 9- 99 | AZ | | B | |
| VHiTMPZ84C43F | 9- 84 | BA | | B | |
| VHiT241282023 | 9- 85 | AT | | B | |
| VHiT3985///-1 | 9- 127 | BA | | B | |
| VHiUPD4066BG1 | 9- 95 | AF | | B | |

| PARTS CODE | NO. | PRICE RANK | NEW MARK | PART RANK | |
|---|---|---|---|---|---|
| VHiUPD8049941 | 9- 126 | AT | | B | |
| VHi12G2000A-1 | 13- 13 | AZ | | B | |
| VHi27128FCK0E | 9- 112 | BK | N | B | |
| VHi27128FDH0A | 9- 112 | BK | N | B | |
| VHi27256FAM0F | 9- 117 | BM | N | B | |
| VHi27256FAM1F | 9- 114 | BM | N | B | |
| VHi27256FBF0A | 9- 117 | BM | N | B | |
| VHi27256FBF1A | 9- 114 | BM | N | B | |
| VHi27256FBZ0A | 9- 117 | BM | N | B | |
| VHi4M462C1/-1 | 13- 12 | AZ | | B | |
| VHi74LS92//-F | 9- 125 | AF | | B | |
| VHi8749/FBB1B | 9- 140 | BP | N | B | |
| VHPGP1S06//-1 | 6- 6 | AF | | B | |
| VHPPC511///-1 | 11- 20 | AM | | B | |
| // | 12- 24 | AM | | B | |
| VHPRPR359F/-1 | 14- 3 | AK | | B | |
| VHS2P4MCY//-1 | 10- 38 | AL | | B | |
| VHVVR61S///-1 | 11- 30 | AG | | B | |
| // | 12- 58 | AG | | B | |
| // | 12- 59 | AG | | B | |
| VRD-HT2EY102J | 14- 4 | AA | | C | |
| VRD-HT2EY103J | 13- 22 | AA | | C | |
| VRD-HT2EY472J | 11- 27 | AA | | C | |
| VRD-HT2EY562J | 11- 25 | AA | | C | |
| // | 12- 30 | AA | | C | |
| VRD-HT2HY151J | 9- 223 | AA | | C | |
| VRD-HT2HY392J | 9- 242 | AA | | C | |
| // | 9- 243 | AA | | C | |
| // | 9- 244 | AA | | C | |
| // | 9- 245 | AA | | C | |
| VRD-RC2EY101J | 9- 152 | AA | | C | |
| // | 9- 186 | AA | | C | |
| // | 10- 90 | AA | | C | |
| VRD-RC2EY102J | 9- 154 | AA | | C | |
| // | 9- 161 | AA | | C | |
| // | 9- 182 | AA | | C | |
| // | 9- 192 | AA | | C | |
| // | 9- 193 | AA | | C | |
| // | 9- 194 | AA | | C | |
| // | 9- 200 | AA | | C | |
| // | 9- 204 | AA | | C | |
| // | 9- 225 | AA | | C | |
| // | 9- 226 | AA | | C | |
| // | 9- 228 | AA | | C | |
| // | 10- 75 | AA | | C | |
| // | 11- 26 | AA | | C | |
| // | 11- 28 | AA | | C | |
| // | 12- 31 | AA | | C | |
| // | 12- 33 | AA | | C | |
| // | 12- 35 | AA | | C | |
| VRD-RC2EY103J | 9- 150 | AA | | C | |
| // | 9- 155 | AA | | C | |
| // | 9- 180 | AA | | C | |
| // | 9- 183 | AA | | C | |
| // | 9- 187 | AA | | C | |
| // | 9- 188 | AA | | C | |
| // | 9- 189 | AA | | C | |
| // | 9- 197 | AA | | C | |
| // | 9- 201 | AA | | C | |
| // | 9- 202 | AA | | C | |
| // | 9- 203 | AA | | C | |
| // | 9- 205 | AA | | C | |
| // | 9- 206 | AA | | C | |
| // | 9- 208 | AA | | C | |
| // | 9- 212 | AA | | C | |
| // | 9- 215 | AA | | C | |
| // | 9- 219 | AA | | C | |
| // | 9- 221 | AA | | C | |
| // | 9- 247 | AA | | C | |
| // | 9- 248 | AA | | C | |
| // | 9- 253 | AA | | C | |
| // | 10- 91 | AA | | C | |
| VRD-RC2EY104J | 9- 198 | AA | | C | |
| // | 9- 199 | AA | | C | |
| VRD-RC2EY123J | 10- 84 | AA | | C | |
| VRD-RC2EY124J | 10- 85 | AA | | C | |
| VRD-RC2EY151J | 10- 80 | AA | | C | |
| VRD-RC2EY152J | 9- 156 | AA | | C | |
| VRD-RC2EY153J | 10- 77 | AA | | C | |
| VRD-RC2EY183J | 10- 86 | AA | | C | |

| PARTS CODE | NO. | PRICE RANK | NEW MARK | PART RANK | |
|---|---|---|---|---|---|
| VRD-RC2EY221J | 9- 246 | AA | | C | |
| 〃 | 9- 249 | AA | | C | |
| 〃 | 9- 252 | AA | | C | |
| 〃 | 10- 74 | AA | | C | |
| VRD-RC2EY222J | 9- 158 | AA | | C | |
| 〃 | 9- 227 | AA | | C | |
| 〃 | 9- 229 | AA | | C | |
| 〃 | 10- 87 | AA | | C | |
| VRD-RC2EY273J | 10- 88 | AA | | C | |
| VRD-RC2EY301J | 12- 30 | AA | | C | |
| VRD-RC2EY330J | 9- 196 | AA | | C | |
| VRD-RC2EY331J | 9- 160 | AA | | C | |
| 〃 | 9- 210 | AA | | C | |
| VRD-RC2EY332J | 9- 151 | AA | | C | |
| 〃 | 9- 190 | AA | | C | |
| 〃 | 9- 233 | AA | | C | |
| VRD-RC2EY333J | 10- 99 | AA | | C | |
| VRD-RC2EY391J | 11- 24 | AA | | C | |
| 〃 | 12- 28 | AA | | C | |
| VRD-RC2EY470J | 9- 220 | AA | | C | |
| VRD-RC2EY471J | 9- 159 | AA | | C | |
| 〃 | 9- 181 | AA | | C | |
| 〃 | 9- 184 | AA | | C | |
| 〃 | 9- 185 | AA | | C | |
| 〃 | 9- 207 | AA | | C | |
| 〃 | 9- 209 | AA | | C | |
| 〃 | 9- 216 | AA | | C | |
| 〃 | 9- 234 | AA | | C | |
| 〃 | 9- 235 | AA | | C | |
| 〃 | 9- 236 | AA | | C | |
| 〃 | 9- 237 | AA | | C | |
| 〃 | 9- 238 | AA | | C | |
| 〃 | 9- 239 | AA | | C | |
| 〃 | 9- 240 | AA | | C | |
| 〃 | 9- 241 | AA | | C | |
| VRD-RC2EY472J | 9- 174 | AA | | C | |
| 〃 | 9- 175 | AA | | C | |
| 〃 | 9- 176 | AA | | C | |
| 〃 | 9- 177 | AA | | C | |
| 〃 | 9- 178 | AA | | C | |
| 〃 | 9- 179 | AA | | C | |
| 〃 | 9- 195 | AA | | C | |
| 〃 | 9- 211 | AA | | C | |
| 〃 | 9- 213 | AA | | C | |
| 〃 | 9- 214 | AA | | C | |
| 〃 | 9- 217 | AA | | C | |
| 〃 | 9- 218 | AA | | C | |
| 〃 | 9- 222 | AA | | C | |
| 〃 | 9- 224 | AA | | C | |
| 〃 | 9- 250 | AA | | C | |
| 〃 | 9- 251 | AA | | C | |
| VRD-RC2EY473J | 9- 230 | AA | | C | |
| 〃 | 9- 231 | AA | | C | |
| VRD-RC2EY560J | 10- 76 | AA | | C | |
| VRD-RC2EY561J | 10- 93 | AA | | C | |
| VRD-RC2EY562J | 9- 153 | AA | | C | |
| 〃 | 9- 191 | AA | | C | |
| VRD-RC2EY680J | 10- 97 | AA | | C | |
| VRD-RC2EY682J | 9- 232 | AA | | C | |
| 〃 | 10- 83 | AA | | C | |
| VRD-ST2EY000J | 9- 157 | AA | | C | |
| 〃 | 9- 257 | AA | | C | |
| 〃 | 9- 258 | AA | | C | |
| 〃 | 9- 259 | AA | | C | |
| 〃 | 9- 260 | AA | | C | |
| 〃 | 9- 261 | AA | | C | |
| 〃 | 9- 262 | AA | | C | |
| 〃 | 9- 263 | AA | | C | |
| VRD-ST2EY362J | 10- 89 | AA | | C | |
| VRD-ST2HY102J | 10- 82 | AB | | C | |
| VRD-ST2HY181J | 10- 72 | AB | | C | |
| VRD-ST2HY220J | 10- 94 | AB | | C | |
| VRD-ST2HY5R6J | 10- 95 | AA | | C | |
| VRD-ST2HY564J | 10- 69 | AB | | C | |
| VRD-ST2HY824J | 10- 71 | AB | | C | |
| VRNRC2EK1002F | 13- 18 | AA | | C | |
| VRNRC2EK1021F | 9- 166 | AA | | C | |
| 〃 | 9- 167 | AA | | C | |
| 〃 | 9- 170 | AA | | C | |
| 〃 | 9- 171 | AA | | C | |

| PARTS CODE | NO. | PRICE RANK | NEW MARK | PART RANK | |
|---|---|---|---|---|---|
| VRNRC2EK1052F | 9- 164 | AA | | C | |
| 〃 | 9- 165 | AA | | C | |
| 〃 | 9- 168 | AA | | C | |
| 〃 | 9- 169 | AA | | C | |
| 〃 | 9- 172 | AA | | C | |
| 〃 | 9- 173 | AA | | C | |
| VRNRC2EK2001F | 13- 19 | AA | | C | |
| VRNRC2EK2002F | 13- 17 | AA | | C | |
| 〃 | 13- 20 | AA | | C | |
| VRNRC2EK2052F | 13- 16 | AA | | C | |
| VRNRC2EK3242F | 13- 24 | AA | | C | |
| VRNRC2EK3321F | 9- 162 | AA | | C | |
| VRNRC2EK4700F | 9- 163 | AA | | C | |
| VRNRC2EK8201F | 13- 23 | AA | | C | |
| VRNRC2EK8871F | 13- 21 | AA | | C | |
| VRS-PT3AB103J | 12- 34 | AB | | C | |
| 〃 | 12- 36 | AB | | C | |
| VRS-PT3AB472J | 12- 35 | AB | | C | |
| 〃 | 12- 37 | AB | | C | |
| VRS-PT3AB333J | 11- 22 | AB | | C | |
| 〃 | 11- 23 | AB | | C | |
| 〃 | 12- 26 | AB | | C | |
| 〃 | 12- 27 | AB | | C | |
| VRS-PT3DB181J | 11- 21 | AB | | C | |
| 〃 | 12- 25 | AB | | C | |
| VRS-PT3DB472J | 12- 32 | AB | | C | |
| VRS-PT3DB750J | 12- 29 | AB | | C | |
| VS2SA673-C/-1 | 9- 266 | AE | | B | |
| VS2SA733-P/-1 | 10- 20 | AE | | B | |
| VS2SB744-Q/-1 | 10- 19 | AE | | B | |
| VS2SC1214-C-1 | 9- 264 | AE | | B | |
| 〔X〕 | | | | | |
| XBPBZ40P06K00 | 50-B10 | AA | | C | |
| XBPSC30P08000 | 50-B24 | AA | | C | |
| XBPSD20P04000 | 50-B26 | AA | | C | |
| XBPSD26P06000 | 50-B27 | AA | | C | |
| XBPSD30P04K00 | 50-B11 | AA | | C | |
| XBPSD30P04000 | 50-B12 | AA | | C | |
| XBPSD30P06KS0 | 50-B25 | AA | | C | |
| XBPSD30P06K00 | 50-B13 | AA | | C | |
| XBPSD30P06000 | 50-B14 | AA | | C | |
| XBPSD30P08K00 | 50-B15 | AA | | C | |
| XBPSD40P06K00 | 50-B16 | AA | | C | |
| XBSSD30P04000 | 50-B17 | AA | | C | |
| XCPSC30P08000 | 50-B18 | AA | | C | |
| XCPSD30P06000 | 50-B19 | AA | | C | |
| XCPSD30P08000 | 50-B20 | AA | | C | |
| XRESJ30-04000 | 50-E06 | AA | | C | |
| XRESJ30-05000 | 50-E01 | AA | | C | |
| XRESJ30-06000 | 50-E02 | AA | | C | |
| XRESJ40-05000 | 50-E03 | AA | | C | |
| XRESJ40-06000 | 50-E04 | AA | | C | |
| XRESJ50-06000 | 50-E05 | AA | | C | |
| XUPSD30P06000 | 14- 5 | AA | | C | |
| 〃 | 50-B21 | AA | | C | |
| XUPSD30P08000 | 50-B22 | AA | | C | |
| XXXSP30L03000 | 50-B28 | AA | | C | |
| 〔0〕 | | | | | |
| 0CBBHZ0011ZZ/ | 10- 9 | AR | | C | |
| 0CBPEZ0026ZZ/ | 10- 107 | AK | | B | |
| 0CBPFZ0111ZZ/ | 10- 108 | AQ | | B | |
| 0CBPHZ0049ZZ/ | 10- 106 | AT | | B | |
| 0CBPJC0332ZZ/ | 10- 102 | AG | | A | |
| 0CBPJC0384ZZ/ | 10- 105 | AG | | A | |
| 0CBPJC0385ZZ/ | 10- 104 | AG | | A | |
| 0CBPJT0088ZZ/ | 10- 103 | AG | | B | |
| 0CBUAA0036CZ/ | 10- 22 | AF | | B | |
| 0CBUAA0054DZ/ | 10- 21 | AN | | B | |
| 0CBUAC0004DZ/ | 10- 17 | AC | | B | |
| 0CBUAC0058AZ/ | 10- 15 | AV | | B | |
| 0CBUAC0078CZ/ | 10- 16 | AG | | B | |
| 0CBUAC0137AZ/ | 10- 18 | AU | | B | |
| 0CBUBA0005AZ/ | 10- 28 | AC | | B | |
| 0CBUBB0087SZ/ | 10- 23 | AN | | B | |
| 0CBUBB0137BZ/ | 10- 34 | AP | | B | |
| 0CBUBC0033CZ/ | 10- 25 | AD | | B | |
| 0CBUBC0070AZ/ | 10- 26 | AF | | B | |
| 0CBUBC0129BZ/ | 10- 27 | AF | | B | |
| 0CBUBC0130AA/ | 10- 24 | AG | | B | |
| 0CBUBC0134AZ/ | 10- 29 | AD | | B | |

| PARTS CODE | NO. | PRICE RANK | NEW MARK | PART RANK | |
|---|---|---|---|---|---|
| 0CBUBC0135AZ/ | 10- 31 | AG | | B | |
| 0CBUBC0152AZ/ | 10- 30 | AE | | B | |
| 0CBUBC0156AZ/ | 10- 32 | AD | | B | |
| 0CBUCB0013AZ/ | 10- 11 | AH | | B | |
| 0CBUCB0018AZ/ | 10- 12 | AH | | B | |
| 0CBUCH0046ZZ/ | 10- 10 | AW | | B | |
| 0CBUCZ0097ZZ/ | 10- 13 | AG | | B | |
| 0CBUCZ0134ZZ/ | 10- 14 | AH | | B | |
| 0CBUDC0041BZ/ | 10- 39 | AQ | | B | |
| 0CBUDZ0017ZZ/ | 10- 36 | AQ | | B | |
| 0CBUECC564AB/ | 10- 68 | AB | | C | |
| 0CBUEFD2R0AF/ | 10- 81 | AB | | C | |
| 0CBUEFD560AF/ | 10- 92 | AC | | C | |
| 0CBUEFE101AH/ | 10- 79 | AC | | C | |
| 0CBUEFE3R0AN/ | 10- 78 | AC | | C | |
| 0CBUEFE470AH/ | 10- 96 | AC | | C | |
| 0CBUEFF563AC/ | 10- 70 | AD | | C | |
| 0CBUEZ0026ZZ/ | 10- 73 | AC | | C | |
| 0CBUEZ0303ZZ/ | 10- 37 | AN | | B | |
| 0CBUFAC102AA/ | 10- 100 | AE | | C | |
| 0CBUFAC501AB/ | 10- 101 | AD | | B | |
| 0CBUFZ0026ZZ/ | 10- 98 | AK | | C | |
| 0CBUGAB222BU/ | 10- 65 | AG | | C | |
| 0CBUGAC101BU/ | 10- 59 | AC | | C | |
| 0CBUGAC102BU/ | 10- 61 | AE | | C | |
| 0CBUGAC331BU/ | 10- 64 | AD | | C | |
| 0CBUGAD221BU/ | 10- 58 | AD | | C | |
| 0CBUGAE100BU/ | 10- 54 | AC | | C | |
| 0CBUGAE332BU/ | 10- 67 | AN | | C | |
| 0CBUGAE471BU/ | 10- 55 | AG | | C | |
| 0CBUGAF1R0BU/ | 10- 62 | AB | | C | |
| 0CBUGAF470BU/ | 10- 48 | AE | | C | |
| 0CBUGAZR47AY/ | 10- 45 | AE | | C | |
| 0CBUGBQ331AG/ | 10- 44 | AY | | C | |
| 0CBUGCF104AP/ | 10- 43 | AD | | C | |
| 0CBUGCF104AR/ | 10- 53 | AC | | C | |
| 0CBUGCF222AD/ | 10- 56 | AB | | C | |
| 0CBUGCM395AD/ | 10- 51 | AQ | | C | |
| 0CBUGCZ102AD/ | 10- 57 | AB | | C | |
| 0CBUGCZ102BC/ | 10- 50 | AE | | C | |
| 0CBUGCZ103AD/ | 10- 60 | AC | | C | |
| 0CBUGCZ221AB/ | 10- 46 | AC | | C | |
| 0CBUGCZ222AB/ | 10- 52 | AC | | C | |
| 0CBUGCZ222AD/ | 10- 66 | AC | | C | |
| 0CBUGCZ332BC/ | 10- 42 | AE | | C | |
| 0CBUGFF103AR/ | 10- 49 | AC | | C | |
| 0CBUGFF104AR/ | 10- 47 | AD | | C | |
| 0CBUGFF473AR/ | 10- 63 | AB | | C | |
| 0CBUGFM104BA/ | 10- 40 | AQ | | C | |
| 0CBUGFM224BA/ | 10- 41 | AR | | C | |
| 0CBUKZ0065ZZ/ | 10- 7 | AH | | C | |
| 0CBUKZ0072ZZ/ | 10- 4 | AY | | C | |
| 0CBUKZ0099ZZ/ | 10- 5 | AR | | C | |
| 0CBUKZ0111ZZ/ | 10- 6 | AP | | C | |
| 0CB129820042/ | 10- 2 | AQ | | B | |
| 0CB129820043/ | 10- 3 | AZ | | B | |
| 0CB129820044/ | 10- 8 | AX | | C | |
| 0CB130820007/ | 10- 1 | AY | | B | |
| 00PLUD7A1135A | 7- 7 | BF | | B | |
| 00PSKHCAM0001 | 7- 3 | AG | | B | |
| 00P01KH311B-3 | 7- 1 | AV | | D | |
| 00P03KH80A/// | 7- 2 | AV | | C | |
| 00P12KH317B// | 7- 6 | AX | | C | |
| 00P24KH284A// | 7- 5 | AD | | C | |
| 00P29KH244A// | 7- 4 | AG | | C | |
| 00P3A131050// | 7- 8 | AB | | C | |
| // | 50-B29 | AB | | C | |

| PARTS CODE | NO. | PRICE RANK | NEW MARK | PART RANK | |
|---|---|---|---|---|---|

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